COMPREHENSIVE CLIMATE ACTION PLAN

FOR GREATER CHICAGO

March 2026

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Executive summary

Greater Chicago stands at a pivotal moment. Climate change is no longer a distant threat — it is here, shaping our weather, our economy, and our communities. Across the region, we are already seeing the costs of inaction: more severe storms and flooding, more intense heat waves, and worsening air quality. These impacts strain infrastructure, damage homes and businesses, raise insurance and energy costs, and threaten human health and economic stability.

At the same time, the global economy is shifting rapidly toward clean energy. Regions that move decisively will be best positioned to attract investment, spur innovation, and create high-quality jobs; those that lag behind will face rising costs and lose competitiveness.

The *Comprehensive Climate Action Plan for Greater Chicago* charts a clear and ambitious path forward — one that reflects not only what is possible, but what is necessary to secure the region's future. It is the first regional framework to address all major greenhouse gas (GHG) sources across a 13-county area spanning Illinois, Indiana, and Wisconsin. Grounded in rigorous data and shaped by partners and community voices, the plan offers a coordinated roadmap for reducing emissions, improving public health, and strengthening economic resilience.

The challenge is immense, and the need for action is urgent. By taking bold, coordinated steps today, Greater Chicago can not only meet its climate responsibilities, but lead the nation in building a clean, inclusive, and competitive economy.

A roadmap for action

This plan gives Greater Chicago a clear, practical roadmap for reducing emissions in line with science-based targets, while reflecting the region's unique economy, infrastructure, and community conditions. It was designed to be useful at the local level. It includes data and examples that local governments, utilities, and community organizations can use to advance their own projects.

It focuses on three fundamentals:

- **Impact:** The plan strategies focus on actions with the greatest potential to cut emissions.
- **Precedent:** The plan builds on the work already underway by local governments, states, utilities, businesses, and community organizations. Where local examples don't yet exist, the plan looks to successful policies and programs in other states to ground its recommendations in what's possible.
- **Influence:** A shared regional framework amplifies local leadership and strengthens our collective voice in shaping state and federal policies.

Guiding principles

The comprehensive climate action plan's steering committee included implementers, subject matter experts, and leaders from impacted communities across a 13-county and 3-state area.

Early in the process, regional agencies, county leaders, and community representatives defined four guiding principles that shape every plan recommendation:

- **Commit to zero:** Embrace transformative strategies that accelerate the region's progress toward the national goal of net zero emissions by 2050 and avoid the worst impacts of climate change.
- **Center people:** Engage underserved and marginalized communities to reduce existing disparities, design strategies to maximize benefits, and advance an inclusive energy transition.
- **Plan for action:** Prioritize actions that move the region toward both short-term goals and long-term climate prosperity. Collaborate with stakeholders to ensure plan recommendations are relevant, realistic, and actionable.
- **Grow a clean economy:** Harness the economic opportunities of climate action to foster innovation, create quality jobs, and position the region as a leader in the clean energy economy.

These principles guided how strategies were selected, modeled, and prioritized, ensuring the plan is both ambitious and achievable.

Understanding our emissions

Greater Chicago produces roughly 152 million metric tons of carbon dioxide equivalent (MMT CO_2e) each year. This gives the region both a responsibility and an opportunity to lead. The good news is that regional emissions have already fallen 20 percent since 2005, which proves that meaningful progress is possible.

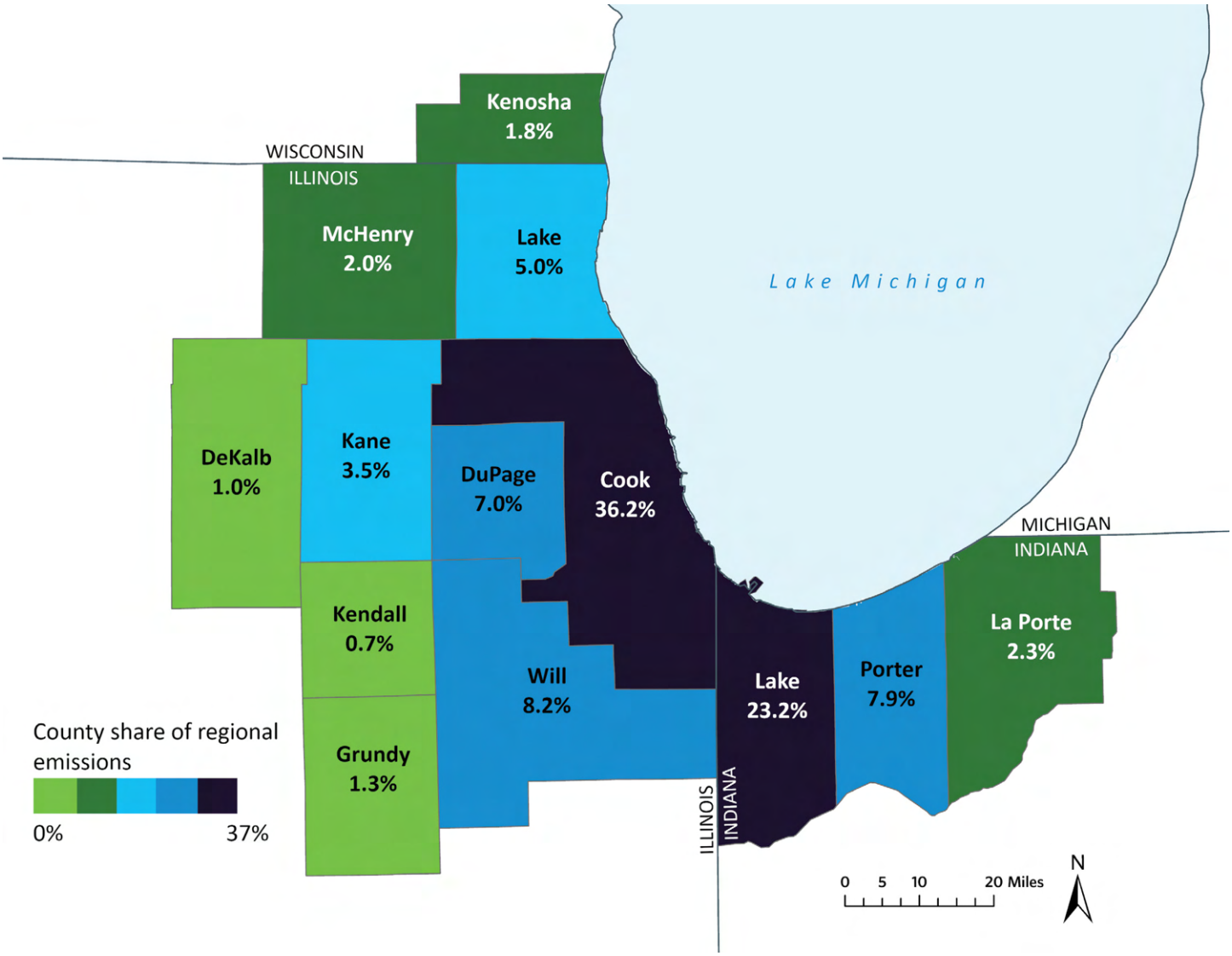
Most emissions come from three sectors:

- **Industry (36%):** reflecting the region's concentration of steelmaking, refining, and manufacturing.
- **Buildings (35%):** driven largely by fossil-fuel-based heating in homes, businesses, and institutions.
- **Transportation (26%):** primarily gasoline and diesel used for passenger and freight travel.

Smaller but important shares come from agriculture, waste, and water and wastewater systems, while trees and wetlands remove about 2 percent of total annual regional emissions through carbon sequestration.

Emissions vary significantly between counties (Figure 1). While Cook County produces the most total emissions, industrial counties in northwest Indiana have the highest emissions per person. This highlights how development patterns, transportation assets, and industry clusters shape the region's emissions landscape — and the need for strategies tailored to each county's unique profile.

Figure 1. Greenhouse gas emissions in the greater Chicago region by county, 2020



Source: CMAP 2020 GHG Inventory, 2024.

The path to 2050

Meeting the climate challenge requires both ambition and a practical understanding of the roles that local, state, and federal partners must play. The plan sets an economywide target to reduce gross GHG emissions 48 percent by 2035 and 86 percent by 2050, compared to 2005 levels.

To demonstrate the action needed to reach these targets, three policy scenarios were developed to illustrate the range of emissions reductions achievable under different levels of policy ambition and coordination:

- **Current policy scenario:** Reflects existing federal and state policies — such as Illinois' Climate and Equitable Jobs Act (CEJA) — and represents a business-as-usual trajectory, reducing emissions 26 percent by 2035 and 36 percent by 2050.
- **Plan implementation scenario:** Builds on the current policy scenario and demonstrates that the region can meet its economywide GHG reduction target through full adoption of 30+ modeled strategies implemented by federal and state actors across all major emissions sectors, reaching 48 percent by 2035 and 86 percent by 2050.
- **State and local implementation scenario:** Highlights the extent of reductions from a subset of modeled strategies in the plan implementation scenario that can be fully implemented by state and local actors, achieving a 58 percent reduction by 2050.

Together, these trajectories highlight both the urgency of acting now and the necessity of coordinating efforts across all scales of government. Deep emissions reductions are within reach but only if communities, states, and federal partners move forward together.

Climate action is not just an environmental necessity; it is a strategic investment in the region's economy, public health, and long-term quality of life.

While federal action is necessary, state and local action can achieve a 58 percent reduction in emissions by 2050.

Figure 2. Plan implementation scenario emissions reductions by sector (2020-2050)

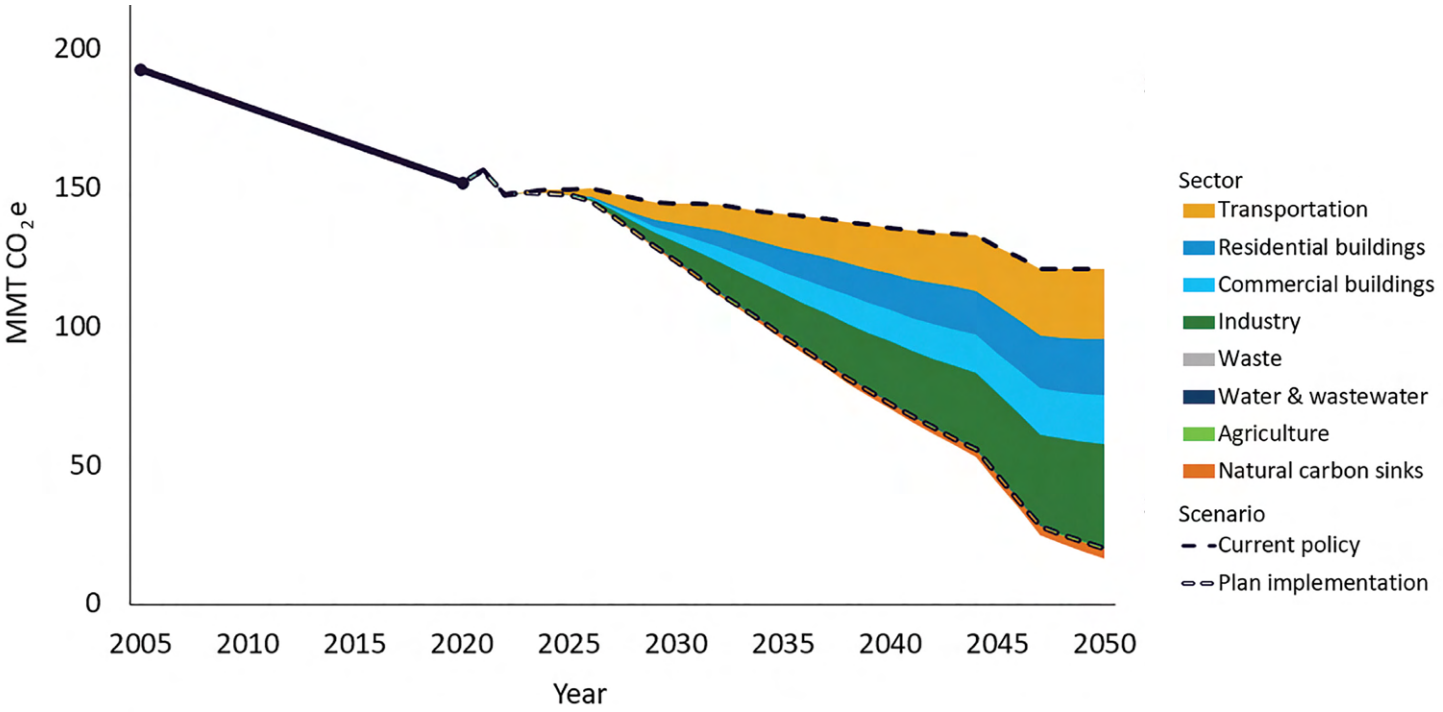
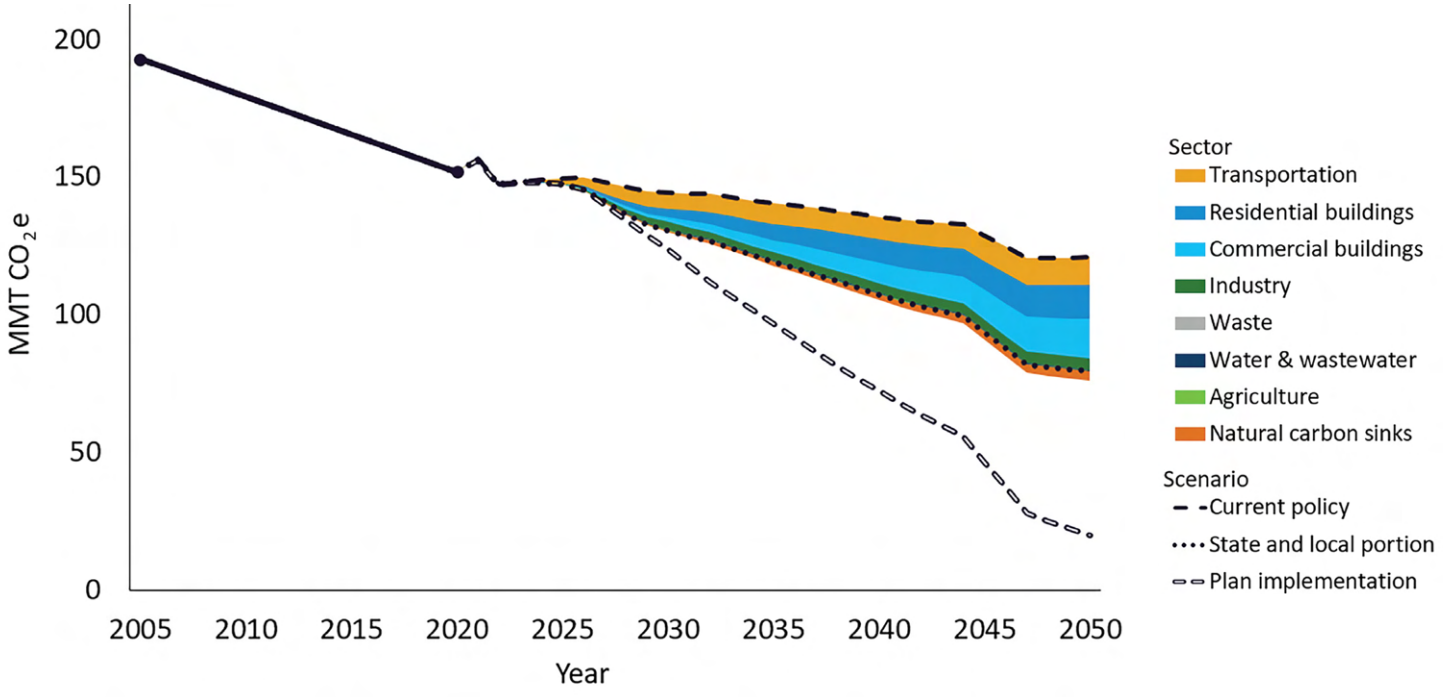


Figure 3. State and local implementation scenario emissions reductions by sector (2020-2050)



Note (for both figures): Agriculture, waste, and water and wastewater emissions reductions are so small that colors do not appear in the chart.

Source (for both figures): CMAP and E3, 2025.

Why it matters

Clean air and healthy people

Greater Chicago consistently ranks among the most polluted metropolitan areas in the U.S. Increased levels of ozone and fine particulate matter (PM2.5) are driven largely by fossil fuel combustion and contribute to higher rates of asthma, respiratory illness, heart disease, and premature death. Across the region, nearly 730,000 adults are estimated to currently live with asthma.[i]

Clean air is a priority for many communities across the region. The plan would significantly reduce harmful pollutants — cutting key pollutants by up to half — and could prevent up to 1,250 premature deaths and nearly 4,000 new asthma cases each year.

Avoided climate impacts

Proactive climate action not only reduces emissions — it reduces risk. Rising greenhouse gas concentrations are warming the atmosphere, altering weather patterns, and intensifying extreme events such as heavier rainfall, more frequent flooding, and more severe heat waves. These impacts already affect the region, driving infrastructure damage and higher public costs. Over the last decade, there were six federally declared disasters in Greater Chicago resulting in over $666.4 million in weather-related disaster costs. Without action, these impacts will intensify, straining public budgets, disrupting transportation and energy systems, and placing the greatest burdens on vulnerable residents.[ii]

Implementing the strategies in this plan helps avoid the most damaging future climate scenarios. Reducing emissions now will limit the severity of extreme heat and related health impacts, reduce the likelihood and cost of major flood events, protect agricultural productivity, and lessen long-term strain on drinking water supplies. These avoided impacts translate into billions of dollars saved in infrastructure repairs, emergency responses, health costs, and lost economic activity.

Improving air quality could prevent 1,250 premature deaths a year by 2050.

Implementing this plan will add nearly 168,000 new jobs over 25 years.

Economic competitiveness

Climate action is a foundation for long-term economic competitiveness. Modernizing energy systems, electrifying industry and transportation, and scaling clean manufacturing can attract new investment and strengthen existing sectors. Implementing the plan will require nearly doubling the workforce in climate-critical occupations, such as electricians, HVAC technicians, engineers, and construction trades, adding nearly 168,000 new jobs through 2050. Supporting the adoption of efficient and low-carbon technologies by existing industries will lower their operational costs, reduce pollution, and position the region as a leader in advanced manufacturing, logistics, and clean energy innovation.

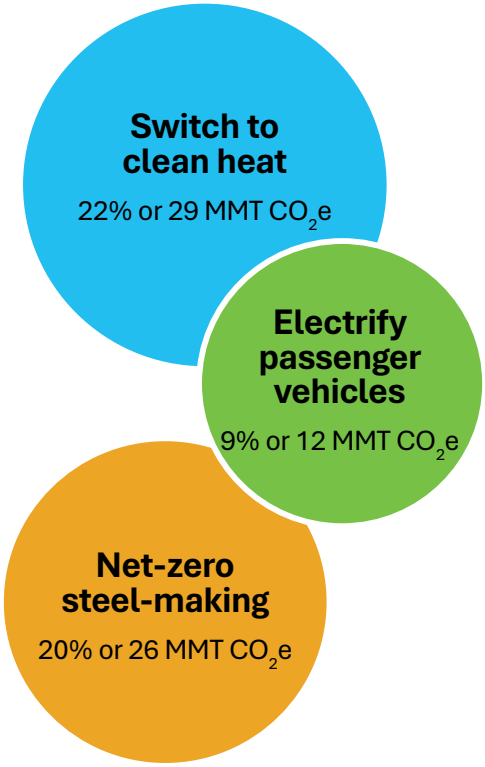
Energy affordability, reliability, and resilience

Lowering energy bills is an important benefit of climate action for residents. Reducing energy waste (especially from burning fuels for heat and transportation), shifting away from price-volatile fuels, and investing in efficiency can help control energy costs over time. Retrofitting buildings, expanding weatherization, and deploying efficient heat pumps can reduce energy use and improve comfort and affordability, especially for lower-income households. Land use strategies that support walkable, compact, and transit-serving communities further reduce energy demand by making it easier to meet daily needs with less driving.

At the same time, modernizing the electric grid and diversifying energy sources strengthens reliability and resilience to outages, extreme weather, and global price shocks. Investments in transit, active transportation, and mixed-use development complement these system upgrades by reducing overall energy use and expanding affordable, low-carbon mobility options. These actions may not eliminate short-term cost pressures, but they reduce exposure to fuel price changes and structural inefficiencies, laying the foundation for long-term affordability, stability, and energy security.

Core actions

Six core actions — which encompass the dozens of strategies identified in this plan — define the region's path to reaching its economywide target of reducing gross GHG emissions by 86 percent from 2005 levels by 2050.



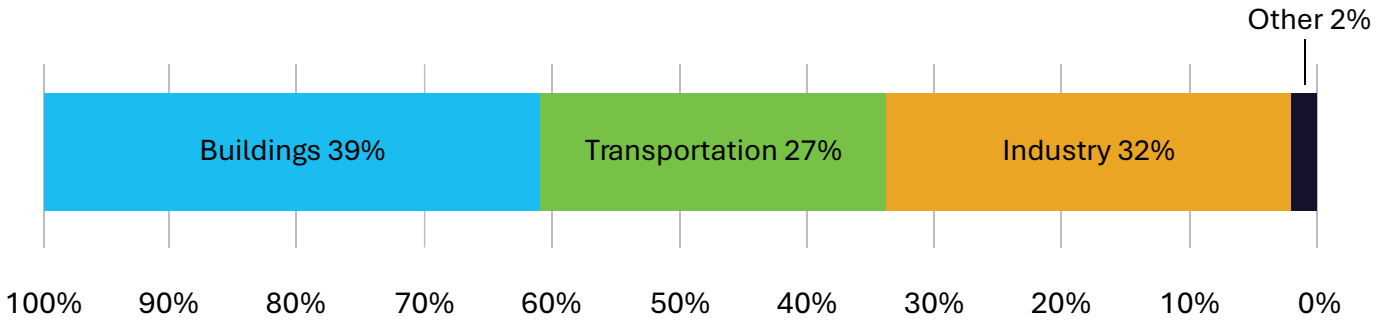
Share of total regional emissions reductions by 2050.

1. **Clean and modernize the grid:** Deliver 100 percent clean electricity through CEJA in Illinois and comparable standards in Indiana and Wisconsin. Build transmission and storage to power electrification of buildings, transportation, and industry.
2. **Improve building efficiency:** Weatherize roughly half of all residences and most commercial buildings, and apply performance standards that cut emissions significantly for nearly half a million of the region's largest buildings.
3. **Switch to clean heat:** Transition buildings off natural gas by requiring all-electric new construction, shift most appliance sales to electric by 2035, and install more than three and a half million heat pumps by 2050.
4. **Reimagine mobility:** Reduce car trips by investing in transit, biking, walking, and compact develoment that shortens travel distances and expands travel options.
5. **Electrify vehicles:** Transition passenger, freight, and fleet vehicles to electric and zero-emission technologies supported by robust charging and grid investments.
6. **Decarbonize industry:** Drive low-carbon manufacturing through efficiency upgrades, process electrification, and clean fuels.

These core actions primarily fall within three sectors — transportation, buildings, and industry — and together account for nearly all of the emissions reductions needed to achieve the region's goals (Figure 4).

Commercial and residential building decarbonization efforts could achieve 39 percent of the region's needed emissions reductions (51 MMT CO_2e). Strategies like all-electric new construction, large-scale deployment of heat pumps, and performance standards for existing buildings drive more than 22 percent of the region's total reductions by advancing clean heating and efficiency.

Figure 4. Emissions reductions that can be achieved by each sector by 2050



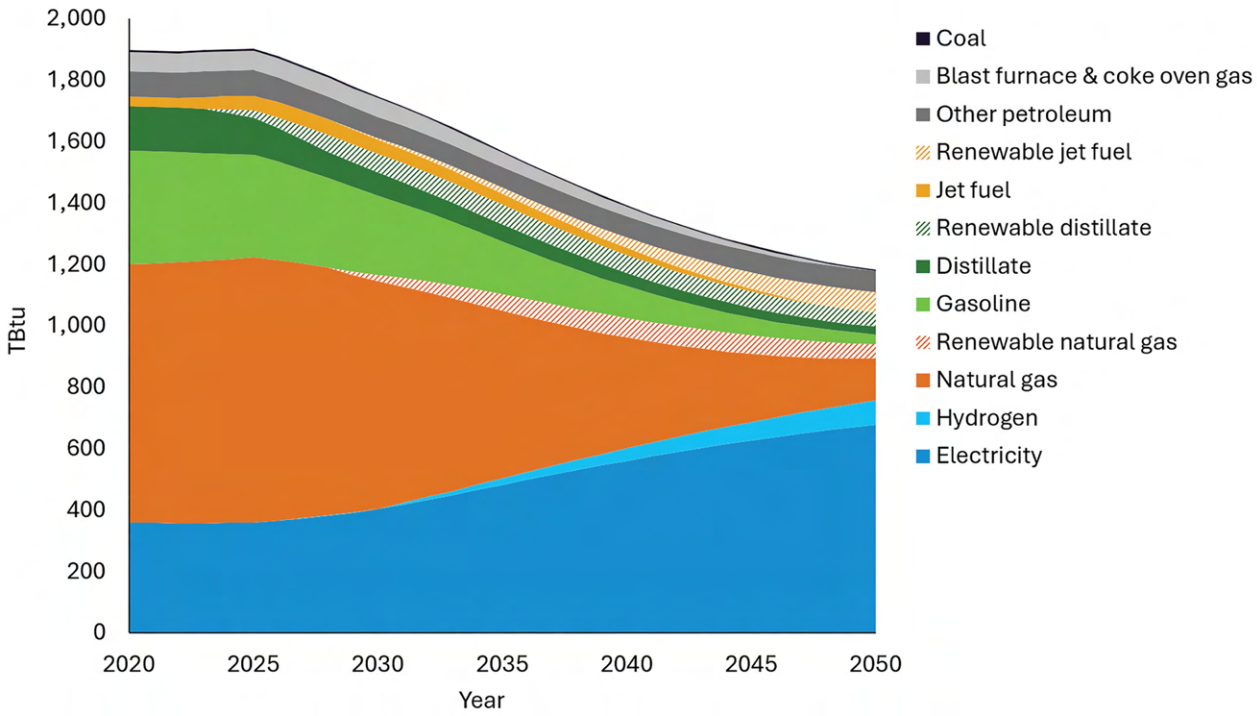
Transportation can deliver approximately 27 percent of the region's needed reductions (35 MMT CO_2e) by 2050. Electrifying light-duty vehicles alone accounts for 9 percent of overall reductions, complemented by investments in transit, pricing strategies, and land use policies that reduce vehicle miles traveled.

Industry accounts for roughly 32 percent of the region's needed reductions (41 MMT CO_2e). Shifting to low-carbon manufacturing processes, electrification, and clean fuels are central strategies, with decarbonizing steelmaking and similar high-emitting processes delivering the single largest industrial impact — roughly 20 percent of the region's overall reductions.

In addition to these core sector strategies, the region must recover and reuse resources to cut emissions and strengthen resilience. Modernizing water, wastewater, and waste systems can reduce water loss, expand water reuse, divert organic materials to reduce landfill methane, and capture energy from waste and wastewater streams. At the same time, restoring and stewarding natural systems is essential to long-term climate stability. Expanding the tree canopy, restoring wetlands and grasslands, and improving soil health across natural and agricultural lands will store carbon, reduce flooding, improve water quality, and cool neighborhoods.

While strategies vary in scale and impact, clean electricity is the foundation of the region's decarbonization roadmap and reducing energy demand makes that transition achievable (Figure 5). Improving energy efficiency across buildings, industry, and transportation lowers costs, reduces strain on the grid, and makes electrification more attainable. Because the emissions profile of every sector depends on how energy is produced, achieving the region's reduction targets requires both accelerating the transition to clean electricity and building the modern grid infrastructure needed to deliver it reliably and affordably.

Figure 5. Energy demand by fuel for the plan implementation scenario (2020-2050)



Source: CMAP and E3, 2025.

Challenges

The plan's reduction target will not be achieved easily given the challenges ahead:

- **Shifting federal priorities:** Federal leadership has been pivotal in recent years, yet changing priorities can create uncertainty for long-term planning. The region must build local strategies resilient to those shifts.
- **Infrastructure and permitting constraints:** Major investments in grid upgrades, clean energy, transit and transit-oriented development, building retrofits, and industrial modernization — along with faster permitting and construction timelines — are needed across all levels of government.
- **Workforce capacity:** Delivering the transition will require rapidly scaling a skilled workforce across the trades and technical professions. While the region has strong foundations through CEJA and robust union-industry partnerships, training pipelines and administrative capacity are not yet at the scale needed to meet rising demand.
- **Affordability:** Energy and housing costs are rising, and some climate solutions have higher upfront costs. Targeted incentives and safeguards will be needed to ensure all communities benefit.

While substantial, the challenges to achieving a clean energy transition are not without precedent. Society has undergone major transformations before — incorporating electricity and indoor plumbing to homes, shifting from horses to automobiles, and adapting to the spread of telecommunications — each of which fundamentally reshaped daily life and expanded economic opportunity. These transitions followed a familiar S-curve: slow adoption at first, rapid uptake as technologies matured and prices fell, followed by normalization. Today, renewables, heat pumps, electric vehicles, and battery storage are already entering the uptake part of the curve with reliable technologies and lower prices. The region should embrace this change because, while the scale is significant, history shows the path forward is well established.

Regional leadership

Achieving the plan's economywide target of reducing gross GHG emissions by 48 percent from 2005 levels by 2035 and 86 percent by 2050 will require every level of leadership — federal, state, local, business, and community — pulling in the same direction. Each has a critical role to play. State and local governments hold the most immediate tools: energy codes, land use planning, fleet transitions, and workforce development. Federal and state government actors must sustain policy and investment support, while the private sector drives innovation and deployment.

No single action or actor can deliver the transformation alone. Working together, partners from around the region (and beyond) can build a future where clean energy powers prosperity, communities are healthier and more resilient, and the region leads in climate progress.

Climate change is the defining challenge of our time, but it is also a generational opportunity to reimagine our economy and communities for the better. Realizing the plan will require collaboration across counties, municipalities, businesses, and residents. The path ahead is ambitious, but the rewards are enduring: a region that thrives through innovation, stewardship, and shared purpose.

The *Comprehensive Climate Action Plan for Greater Chicago* shows that deep decarbonization is both necessary and achievable. It provides the region with the roadmap to deliver measurable results.

01

Introduction

The *Climate Action Plan for Greater Chicago* is a comprehensive strategy to address major greenhouse gas (GHG) sources, sinks, and sectors in the plan area. The plan estimates the emissions from, and proposes mitigation strategies for, a 13-county area spanning 9 counties in Illinois, 3 in Indiana, and 1 in Wisconsin — a region referred to in this plan as Greater Chicago (Figure 1).

By evaluating the effectiveness of a wide range of potential climate strategies, the plan maps out the ambitious path the region must take to meet science-based international climate goals by 2050. It establishes economywide and sector-specific GHG reduction targets and highlights co-benefits, including improved air quality and public health.

As noted throughout this plan, there is no single solution to the climate challenges facing the region. Addressing them requires collective action — residents, businesses, and governments at every level working together to advance the bold strategies outlined below.

The plan was developed through a partnership between the Chicago Metropolitan Agency for Planning (CMAP), Northwestern Indiana Regional Planning Commission (NIRPC), and Metropolitan Mayors Caucus, with support from the U.S. Environmental Protection Agency's (USEPA) Climate Pollution Reduction Grant program. The plan builds on previous regional planning efforts by the partners as well as work done by counties, municipalities, and other organizations across the region.[1]

Climate action requires both mitigation (reducing emissions) and adaptation (preparing for ongoing climate impacts). While this plan focuses solely on reducing emissions, it complements regional and local efforts to build resilience to extreme weather and climate change.[2] By coordinating efforts across jurisdictions, leveraging past planning work, and providing clear actions, the plan serves as a roadmap for reducing emissions, improving public health, and strengthening the greater Chicago region's economy.

The climate challenge is here

Climate change is already affecting the health, safety, and prosperity of communities across Greater Chicago. As global temperature rise, climate-fueled changes — such as storm frequency and intensity, extreme weather, and air pollution — are escalating. These changes drive costly and widespread impacts: storm damage to homes and infrastructure, higher repair and insurance costs, increased energy demand for heating and cooling, disruptions to transportation systems, and greater risks of health issues from air pollution and heat. Without decisive action to mitigate climate change, these harms will continue to worsen.

Flooding and extreme heat pose the greatest risk to this region. Over the past decade, 5 federally declared flood-related disasters and numerous other flood events have caused extensive damage, with some storms delivering more than 8 inches of rainfall in just 12 hours.[3] The intensity of heavy rainfall events is expected to increase, with the maximum 24-hour precipitation amount rising by 8 percent by mid-century and 21 percent by late century.[4] At the same time, both average daily and nighttime temperatures are rising. If emissions continue unchecked, the annual number of days with a heat index — or "feels like" temperature — above 100 degrees Fahrenheit (°F) is projected to more than double over the next 30 years.[5]

While climate change affects everyone, its impacts are not felt equally. Urban areas face higher risks from extreme heat and flooding, due to heat-absorbing surfaces and limited natural drainage. Low-income, disinvested, and overburdened communities are often located in more hazard-prone areas and have fewer resources to prepare for or recover from extreme weather.[6] People with asthma, diabetes, and cardiovascular disease are more vulnerable to heat and air pollution.[7] These health conditions are disproportionately prevalent in low-income communities of color, intensifying existing unfair conditions.[8]

At the same time, agricultural lands face increasing heat, drought, flooding, and shifting seasonal patterns that threaten crop yields and livestock health. Our natural resources are stressed by invasive species and changing conditions, reducing their ability to provide essential ecosystem services, including carbon sequestration.

Climate impacts are not just a local phenomenon. Climate disruptions — including sea level rise, wildfires, drought, and crop failures — affect supply chains, drive up costs for goods and energy, disrupt trade, and threaten food security. Because the region's economy is inextricably tied to national and global markets, external shocks can translate into local impacts: higher business operating costs, reduced workforce productivity, and slower economic growth. Proactive climate mitigation actions are therefore not only environmental imperatives but also essential strategies for safeguarding the region's economic stability and competitiveness.

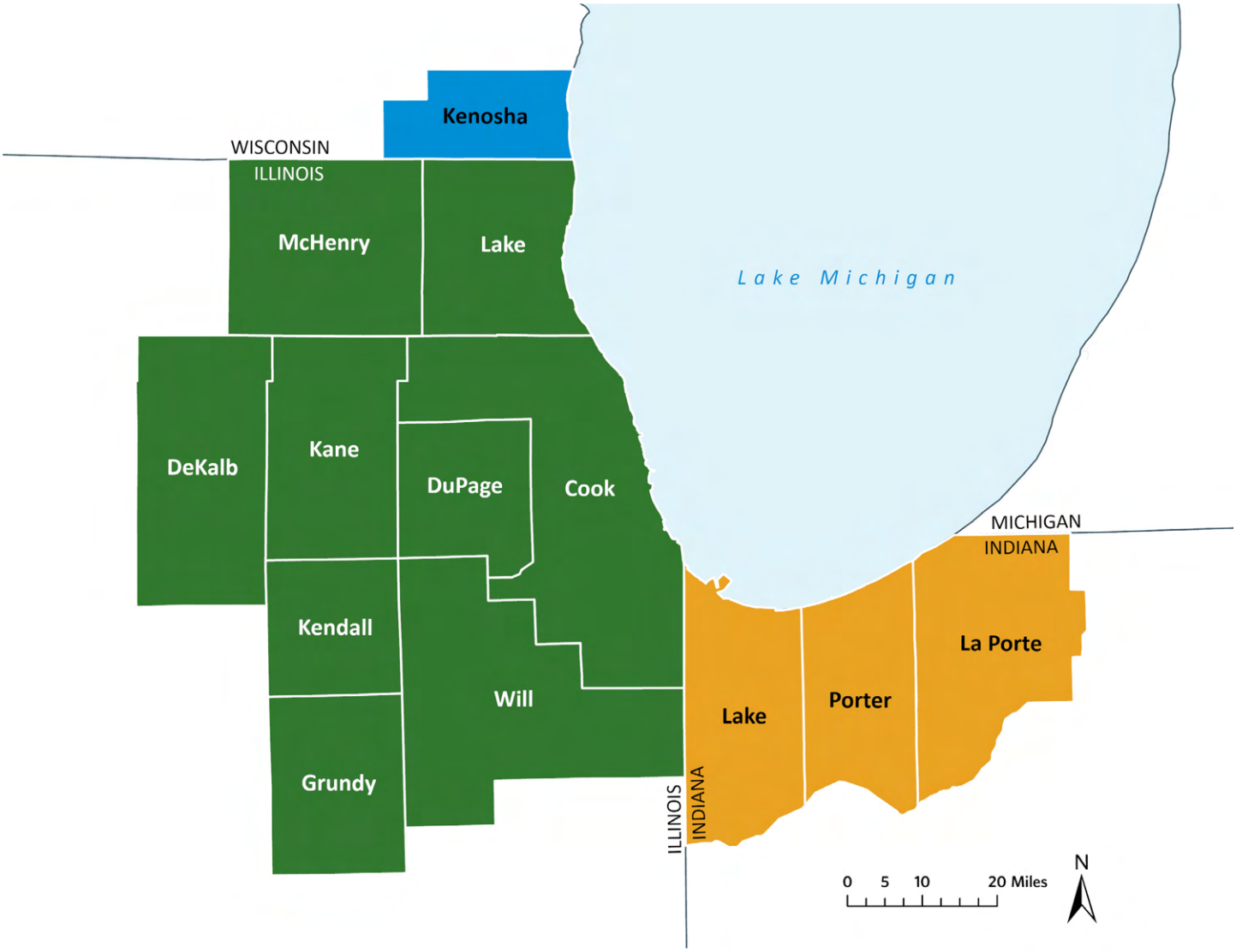
The causes of these changes are clear. GHG emissions from burning fossil fuels for power generation, transportation, and industrial activity are driving climate change. Greater Chicago is a major contributor to the United States' total GHG output, giving the region both a unique responsibility and an opportunity to lead in reducing emissions. If it were a state, the region's total emissions would rank 11th in the country.[9]

While progress in energy efficiency and renewable energy has reduced emissions nationally and regionally over the past two decades, these efforts alone are not enough. Without ambitious, coordinated action to transform how we produce and use energy, climate change and its consequences will intensify. The path to a more resilient, healthy, fair, and inclusive future is within reach, but realizing it requires bold, collective action now.

Planning process

This plan was developed in accordance with the requirements set forth in the USEPA Climate Pollution Reduction Grant program.[10] The planning boundary was adjusted to best engage partners, resulting in a final 13-county area spanning 9 counties in Illinois (Cook, DeKalb, DuPage, Grundy, Kane, Kendall, Lake, McHenry, and Will), 3 in Indiana (Lake, La Porte, and Porter counties), and 1 in Wisconsin (Kenosha County) (Figure 1).

Figure 1. Study area for the plan



Source: CMAP, 2024.

Tasks and timeline

Developed in collaboration with regional partners, the plan was completed between January 2024 and November 2025 using a stakeholder-driven process organized around seven core tasks:

1. Establish guiding principles.
2. Create greenhouse gas emissions inventory.
3. Set emissions reduction targets.
4. Identify strategies to reduce emissions.
5. Model how strategies impact emissions.
6. Estimate how strategies improve air quality and public health.
7. Develop the plan.

Stakeholder engagement informed every stage of the process. The project team drew on the expertise of implementers, technical experts, and community members to identify effective, fair, and inclusive strategies for reducing GHG emissions and to build momentum for implementation. Central to this approach was creating a project steering committee and four working groups, and consulting CMAP's Climate Committee. Each group served a distinct role and included members selected to reflect that focus. To support inclusive participation, community-based organizations received compensation for their contributions to the process.[11]

Guiding principles for developing the plan

Early in the planning process, the Steering Committee established four guiding principles to shape the development of the plan. These principles provided a shared foundation for decision making on the engagement approach, emissions reduction targets, and plan content, ensuring consistency and alignment throughout the process.

- **Commit to zero.** Embrace transformative strategies that accelerate the region's progress toward the national goal of net zero emissions by 2050 and avoid the worst impacts of climate change.
- **Center people.** Engage areas of persistent poverty and marginalized communities to reduce existing disparities, design strategies to maximize benefits, and advance an inclusive energy transition.
- **Plan for action.** Prioritize actions that move the region toward both short-term goals and long-term climate prosperity. Collaborate with stakeholders to ensure plan recommendations are relevant, realistic, and actionable.
- **Grow a clean economy.** Harness the economic opportunities of climate action to foster innovation, create quality jobs, and position the region as a leader in the clean energy economy,

Steering Committee

The Steering Committee included regional implementers, subject matter experts, and leaders from impacted communities across Greater Chicago. Over the course of four meetings, its role was to guide the planning process — providing input on plan principles, emissions reduction targets, messaging, overall strategy, and draft recommendations — as well as to build support for plan implementation following completion. Several members also served on CMAP's Climate Committee, NIRPC's Environment Committee, and the NIRPC Climate Planning Work Group, helping to bridge discussions across topics and foster collaboration among partners. A full list of member organizations is provided in Appendix A.

Working groups

Supporting the Steering Committee, four working groups and CMAP's Climate Committee provided additional expertise and guidance throughout plan development. Each group contributed distinct perspectives and areas of focus, helping to ensure that strategies reflected both technical rigor and community priorities. Find a list of participating organizations in Appendix A.

- **Community Working Group.** This group was tasked with ensuring both the plan and planning process reflected the priorities of low-income and disinvested communities. The group shaped the community engagement activities used to identify priorities by providing feedback on the topics and methods. Members included community-based organizations, institutions, and advocacy groups with experience advancing goals related to air quality, public health, clean energy, environmental protection, and workforce development. This group met four times, with several members also serving on the Steering Committee and other working groups to represent community needs in all discussions.
- **Sector working groups for buildings, industry, and transportation.** Comprised of public and private implementers, subject matter experts, and community representatives, these groups reviewed and proposed sector-specific strategies, goals, and targets during three meetings per group. They reviewed modeling results, shared data and resources, and refined messaging to ensure each sector's recommendations were practical, ambitious, and aligned with regional priorities.
- **CMAP Climate Committee.** This standing committee supplemented the Steering Committee and working groups by providing broad oversight and expertise across topics over the course of seven meetings. In addition to guiding overall plan development, the committee focused on waste, water and wastewater, agriculture, and natural carbon sequestration.

In addition to these formal working groups, the project team engaged other regional bodies, including the NIRPC Environment Committee, Metropolitan Mayors Caucus Environment Committee, and the CARE cohort of community-based organizations in the CMAP region, to share progress, gather input, and strengthen alignment across the region's climate and sustainability efforts.

Community engagement

Public engagement focused on identifying community priorities, raising awareness of the benefits of GHG emission reductions, and building capacity for continued collaboration in climate action. Engagement activities explored the effects of climate change, barriers and opportunities to reduce emissions, and ways reduction strategies can deliver additional benefits to the region's communities.

Recognizing the impacts of climate change and pollution are not experienced equally, engagement efforts prioritized input from low-income and disinvested communities. These communities often face greater exposure to climate risks and air pollution, and may have fewer resources to adopt clean energy solutions or access the benefits of the clean energy transition. Gathering this perspective helped craft plan strategies that minimize potential burdens and maximize community benefits. The team also reviewed recent regional planning initiatives to learn from input related to emissions reduction.

Opportunities for community input took place over the summer and fall of 2025 and included an online questionnaire (in English and Spanish) and workshops facilitated by community-based organizations.

Across all engagement activities, several key themes emerged:

- **Alignment with community priorities:** Residents emphasized that decarbonization efforts should advance existing local goals, such as improving air quality, expanding transportation options, and increasing trees and green space.
- **Balancing immediate needs:** Many participants noted that day-to-day challenges, such as affording rent and accessing fresh food, take precedence over climate concerns.
- **Rising climate impacts:** Increasing flooding, heat, and poor air quality incidents are growing concerns for communities' public health and safety.
- **Transportation access:** Limited transit, walking, and biking options constrain residents' ability to participate in emissions-reducing activities.
- **Utility costs:** Many respondents reported difficulty paying for gas, electricity, and water bills.
- **Access to fresh and healthy food:** Many participants noted a lack of fresh and healthy food options in their communities and a desire for more affordable produce in grocery stores and community gardens.
- **Financial barriers:** Upfront costs limit residents' ability to shift to electric appliances and vehicles.
- **Expand education and outreach:** Community outreach and education are needed to improve understanding of local issues, communicate the benefits of decarbonization efforts, share resources on assistance programs, and build trust between community members and government agencies.

The following sections summarize the feedback received from community workshops and the public questionnaire. While the workshops were largely concentrated in the areas with the most emissions, the questionnaire was broadcast across the entire region (Figure 2). Find more information on these efforts in Appendix A.

Community workshops

Community-based organizations engaged in the Steering Committee and working groups were invited to host and facilitate local workshops, bringing the planning process directly into areas experiencing some of the highest levels of air pollution and climate impacts in the region. These workshops created space for residents to share lived experiences, discuss local climate change impacts, and identify priorities for the plan.

Host organizations received a stipend[12] for their time and effort, as well as workshop materials in English and Spanish, and participated in an orientation session. This approach ensured that engagement was community-led, accessible, and grounded in local context.

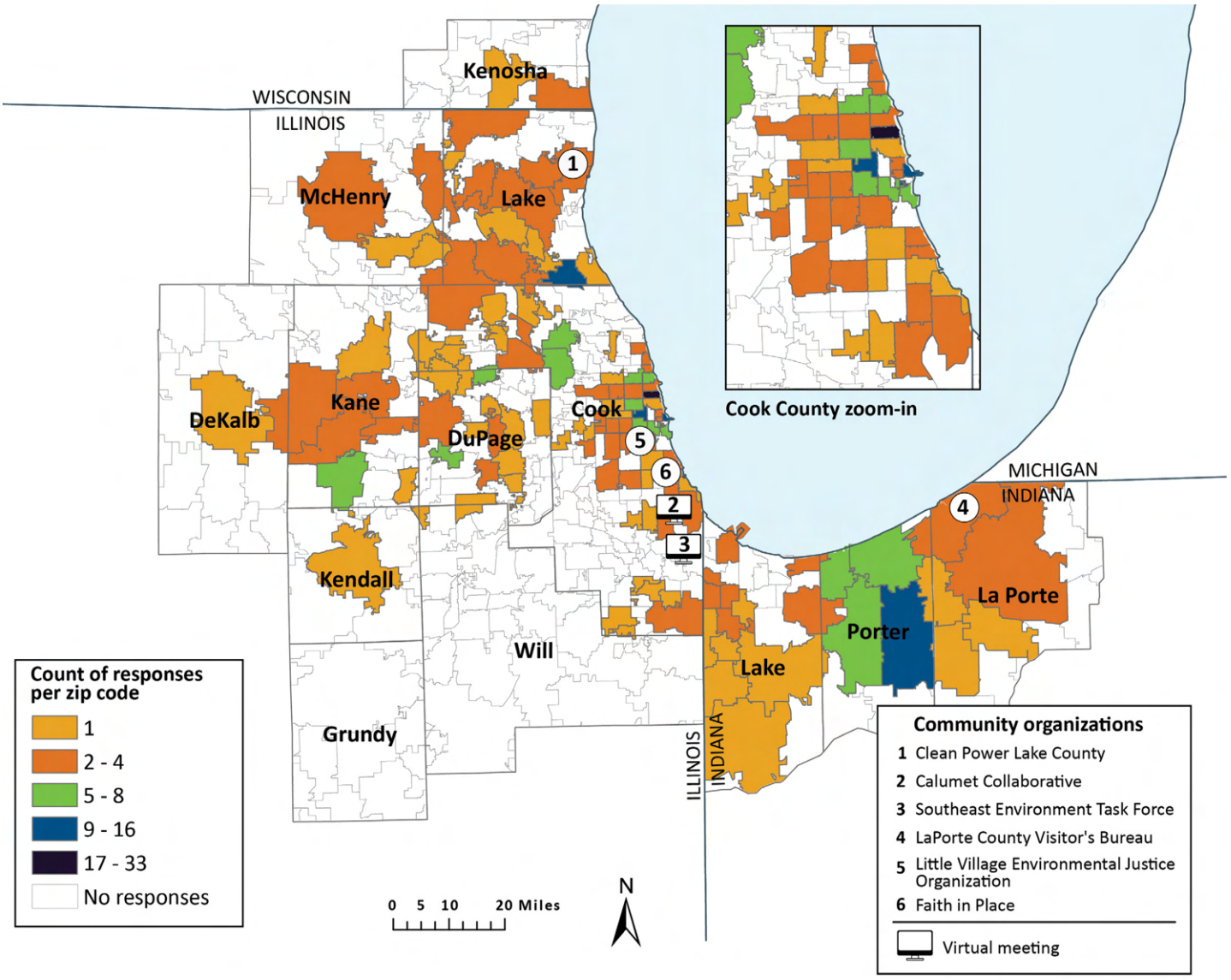
The following organizations hosted workshops:

- Clean Power Lake County – July 15, 2025
- Calumet Collaborative – July 30, 2025
- Little Village Environmental Justice Organization – July 31 through August 3, 2025[13]
- La Porte County Visitor's Bureau – August 14, 2025
- Southeast Environmental Task Force – August 14, 2025
- Faith in Place – October 21, 2025

Public questionnaire

To supplement the workshops, an online questionnaire was distributed to residents across the region. Available in English and Spanish, the questionnaire mirrored the workshop questions to capture perspectives on climate impacts and community priorities throughout Greater Chicago. It remained open for six weeks and received 413 responses. Participants who completed the questionnaire were entered in a drawing to win one of twenty $20 general-use gift cards.[14]

Figure 2. Community workshop locations and questionnaire response rates by zip code



Source: CMAP and MUSE, 2025.

02

Greenhouse gas emissions and trends

Greenhouse gas inventories help the region understand emissions sources, trends, and the impact of mitigation strategies. The plan relies on two inventories — 2005, chosen as the baseline for reduction targets, and 2020, the most recent year with complete data — to represent historical and current conditions. A comparison of both inventories shows that real progress is possible, with regional emissions already dropping 20 percent from 2005.

Both inventories cover 13 counties in the greater Chicago region across 8 sectors: transportation, residential and commercial buildings, industrial processes, agriculture, waste, and water and wastewater.[15] County-level emissions include estimates for carbon dioxide, methane, and nitrous oxide, presented as carbon dioxide equivalent (CO_2e), as well as accounting for emissions offset by natural carbon sequestration from trees, forests, and wetlands.

Pandemic-related shifts in transportation and energy use make 2020 an atypical year in some datasets, but it remains a valid baseline for this analysis. The inventory integrates modeled and reported data across multiple time scales and geographies, which helps smooth short-term disruptions such as those experienced in 2020. Despite differences in data sources and methodology, results are consistent with CMAP's 2019 seven-county inventory: the CMAP region produced 109.5 MMT CO_2e in 2020, comparable to 113.1 MMT CO_2e in 2019.

This section presents results from the 2020 GHG inventory by sector and geography, and emissions trends between 2005 and 2020. Find more information about the inventories in Appendix B.

2020 GHG emissions

In 2020, Greater Chicago produced 152 million metric tons of carbon dioxide equivalent (MMT CO_2e). The region is a major contributor to the United States' total GHG output, and therefore plays a critical role in meeting international reduction goals. If it were a state, Greater Chicago's total emissions would rank 11th in the country.[16]

The inventory reflects end-use emissions from fuel consumption in homes, vehicles, and industry as well as emissions from electricity generation serving the region.[17] Emissions from electricity and on-site natural gas use are allocated to their respective end-use sectors. Electricity usage accounts for 22 percent of total emissions, while on-site natural gas use in buildings and industry contributes 29 percent. Transportation emissions are primarily from gasoline and diesel.[18]

Emissions by sector

The three largest sectors by emissions — industry (36 percent), commercial and residential buildings (35 percent), and transportation (26 percent) — account for 97 percent of total emissions (Figure 3). Accordingly, the region's emissions profile reflects its role as a national transportation and industrial hub. Greater Chicago is home to 10 interstate highways, 6 Class I railroads, one of the nation's busiest air-cargo hubs, and the only maritime connection between the St. Lawrence Seaway and the Mississippi River system. These transportation assets make the region an attractive base for energy-intensive industries such as iron and steel production. Its long history as a manufacturing and logistics center — combined with its reliance on fossil fuels — drives a large share of regional emissions.

At the same time, the region's continental climate creates significant heating and cooling demands, particularly in its older building stock, which tends to be less efficient. As a result, residential and commercial energy use remains a major emissions source.

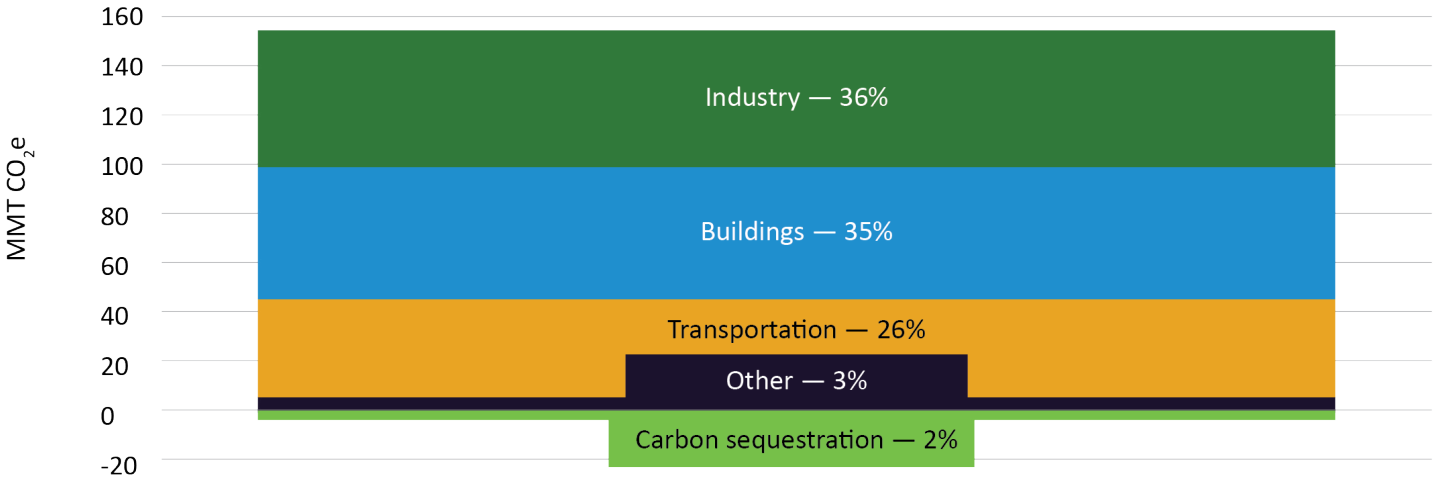
The remaining regional emissions (3 percent) come from agriculture, waste, and water and wastewater systems. Natural carbon sequestration of trees, forests, and wetlands removes 2 percent of annual emissions. Because much of the region's natural lands have been converted for agriculture or urban development, its carbon sequestration capacity is lower than the national average.

A closer look at each sector reveals distinct patterns (Figure 4). In transportation, on-road light duty vehicles are the dominant source of emissions, but heavy-duty vehicles contribute disproportionately due to their higher emissions per mile traveled. Off-road transportation sources generate nearly the same emissions as medium- and heavy-duty vehicles, with diesel off-road equipment for construction, industrial sites, lawn and garden use, and aviation making up the largest shares. This highlights the significant fuel use occurring beyond the region's road network.

In buildings, space heating is the largest source of emissions. Most of this comes from natural gas, with only about 10 percent of homes using electric heating. Space heating alone accounts for over half of all building-related emissions, making it a key focus for reductions. Commercial and residential buildings also rely heavily on electricity to run equipment, lighting, and ventilation systems.

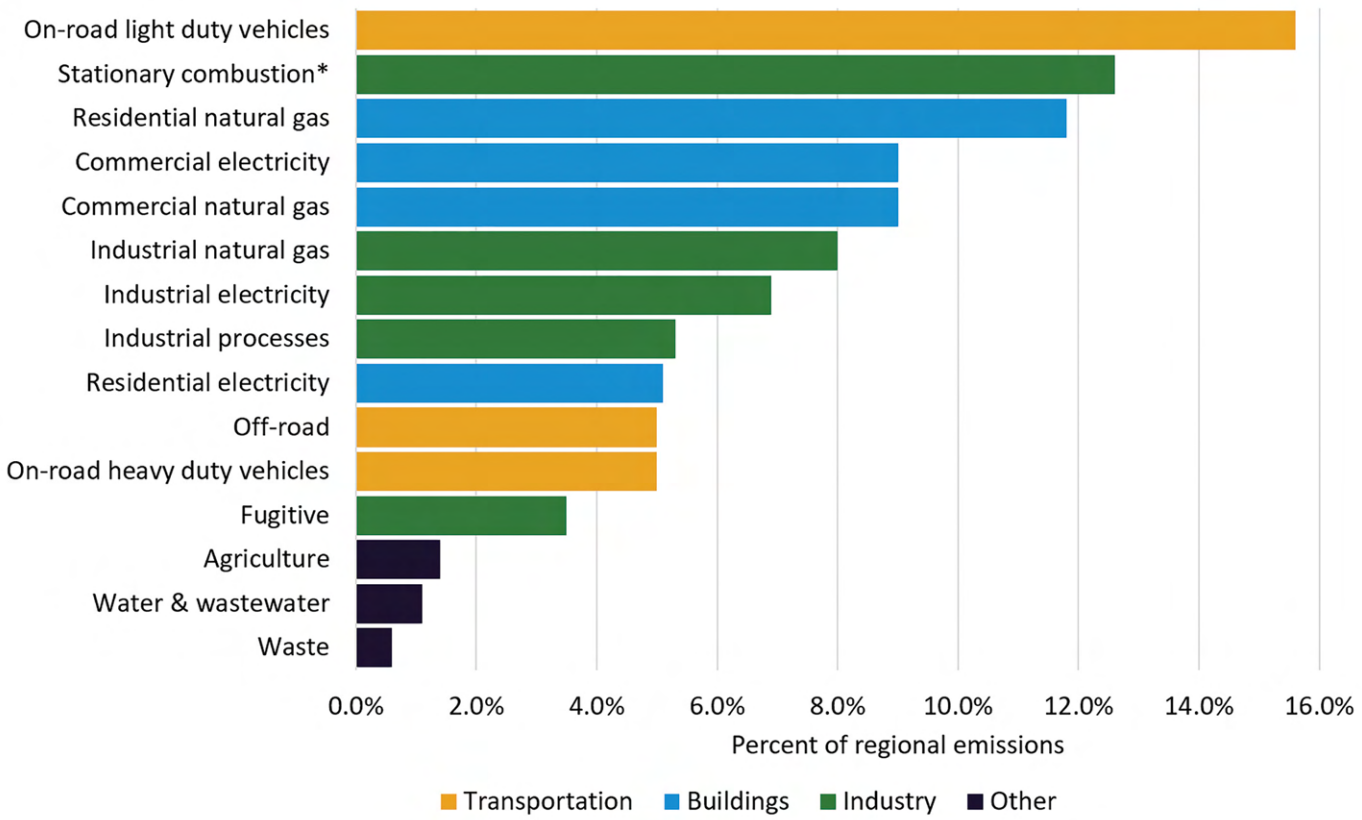
Most industrial emissions come from activities, such steelmaking, petroleum refining, chemical manufacturing, and cement and lime production. Indiana produces roughly 27 percent of all U.S.-made steel, much of it in the region. Regional steel production in blast furnaces, where iron ore is reduced with coke and other inputs to produce molten iron, is responsible for 74 percent of industrial stationary combustion emissions and 56 percent of all industrial process emissions.

Figure 3. Greenhouse gas emissions in Greater Chicago by sector, 2020



Source: CMAP 2020 GHG Inventory, 2024.

Figure 4. Greenhouse gas emissions in Greater Chicago by subsector, listed in order of greatest to least share of the total inventory, 2020



*Industrial stationary combustion emissions exclude natural gas. Agriculture, water and wastewater, and waste do not have subsectors.

Source: CMAP 2020 GHG Inventory, 2024.

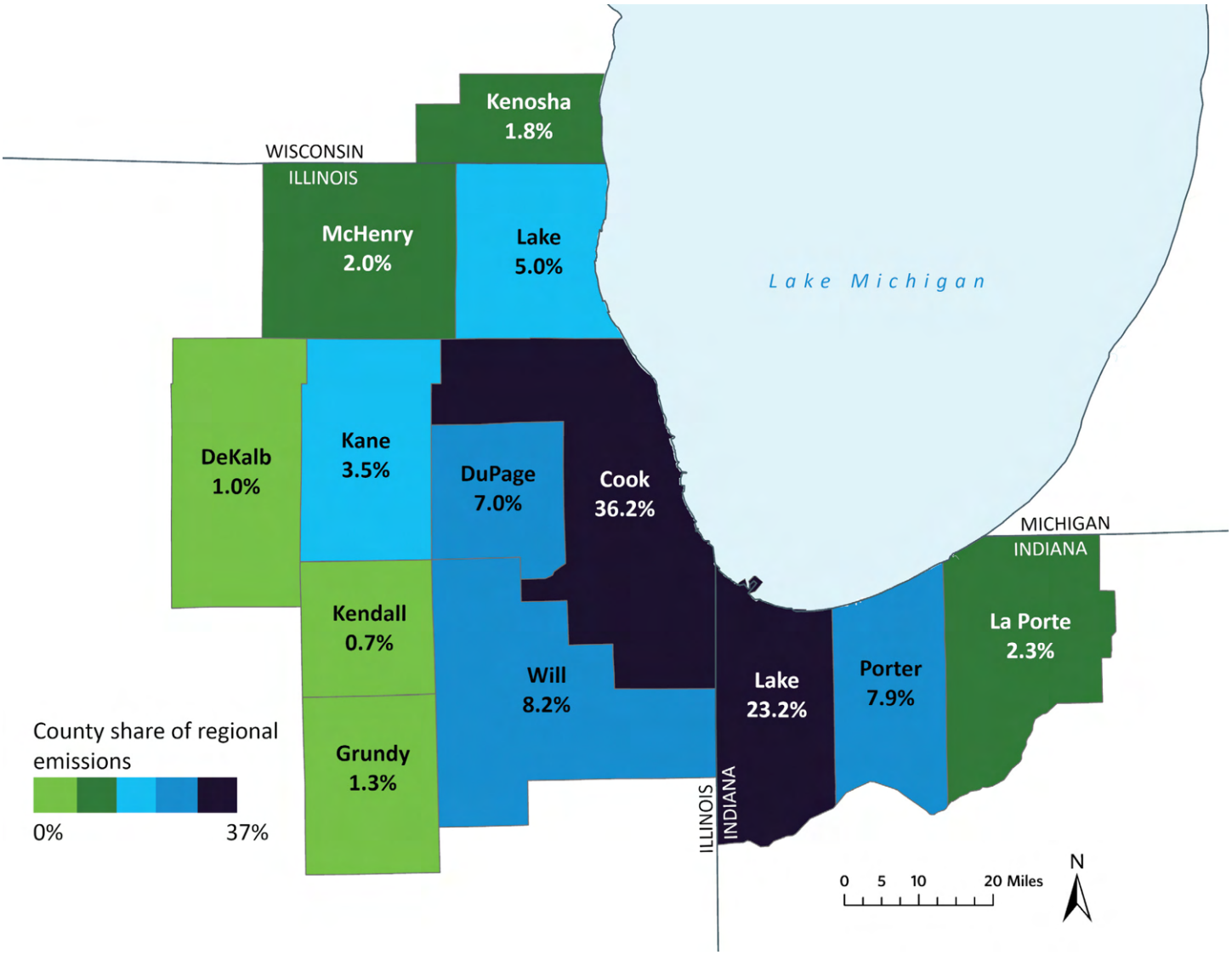
Emissions by geography

GHG emissions vary greatly by county, reflecting differences in population size, development age and pattern, electricity generation mix, and regional clusters of manufacturing and logistics. Cook County, home to more than half the region's residents, generates over a third of total emissions (Figure 5). Lake County, Indiana, produces nearly a quarter — driven largely by the concentration of heavy industry along Lake Michigan. Porter and Will counties also contribute significant shares, reflecting Porter County's heavy industrial activities and Will County's larger industrial, building, and freight-related activities.

When viewed per capita, however, a different picture emerges (Table 1). Lake and Porter counties in Indiana stand out with the highest emissions per person, approximately 70 MT CO_2e — several times higher than the regional average of 15.6 MT CO_2e per person — due to their intensive industrial activity. In contrast, faster-growing suburban counties such as Kane, Kendall, and McHenry show the lowest per capita emissions, reflecting a more residential and service-oriented economy. Despite being home to many industrial businesses, Cook County stands out as an outlier: even with its sizable industrial base, its per-capita emissions are comparatively low. This likely reflects its extensive transit network, compact development pattern, and lower rates of vehicle ownership.

These trends highlight how development patterns, transportation assets, and business clusters shape the region's emissions landscape — and the need for strategies tailored to each county's unique profile.

Figure 5. Greenhouse gas emissions in Greater Chicago by county, 2020



Source: CMAP 2020 GHG Inventory, 2024.

Table 1. Greenhouse gas emissions in Greater Chicago, total and per capita, by county, 2020

County	Total emissions (MMT CO_2e)	Per capita emissions
Cook County, IL	54.8	10.4
DuPage County, IL	10.5	11.3
Kane County, IL	5.3	10.2
Kendall County, IL	1.1	8.2
Lake County, IL	7.6	10.6
McHenry County, IL	3.0	9.6
Will County, IL	12.5	17.9
DeKalb County, IL	1.5	15.2
Grundy County, IL	2.0	37.9
Lake County, IN	35.2	70.5
La Porte, IN	3.4	30.9
Porter, IN	12.0	69.3
Kenosha County, WI	2.7	15.7

Note: National average per capita emissions are 18.11 MT CO_2e/person.[19]

Source: CMAP 2020 GHG Inventory, 2024.

GHG emissions trends since 2005

In 2005, the greater Chicago region produced 189 MMT CO_2e. By 2020, emissions had fallen by 20 percent, a reduction of roughly 38 MMT CO_2e. While progress is not yet sufficient to meet long term climate goals, it demonstrates that targeted action can drive measurable change.

Trends by sector

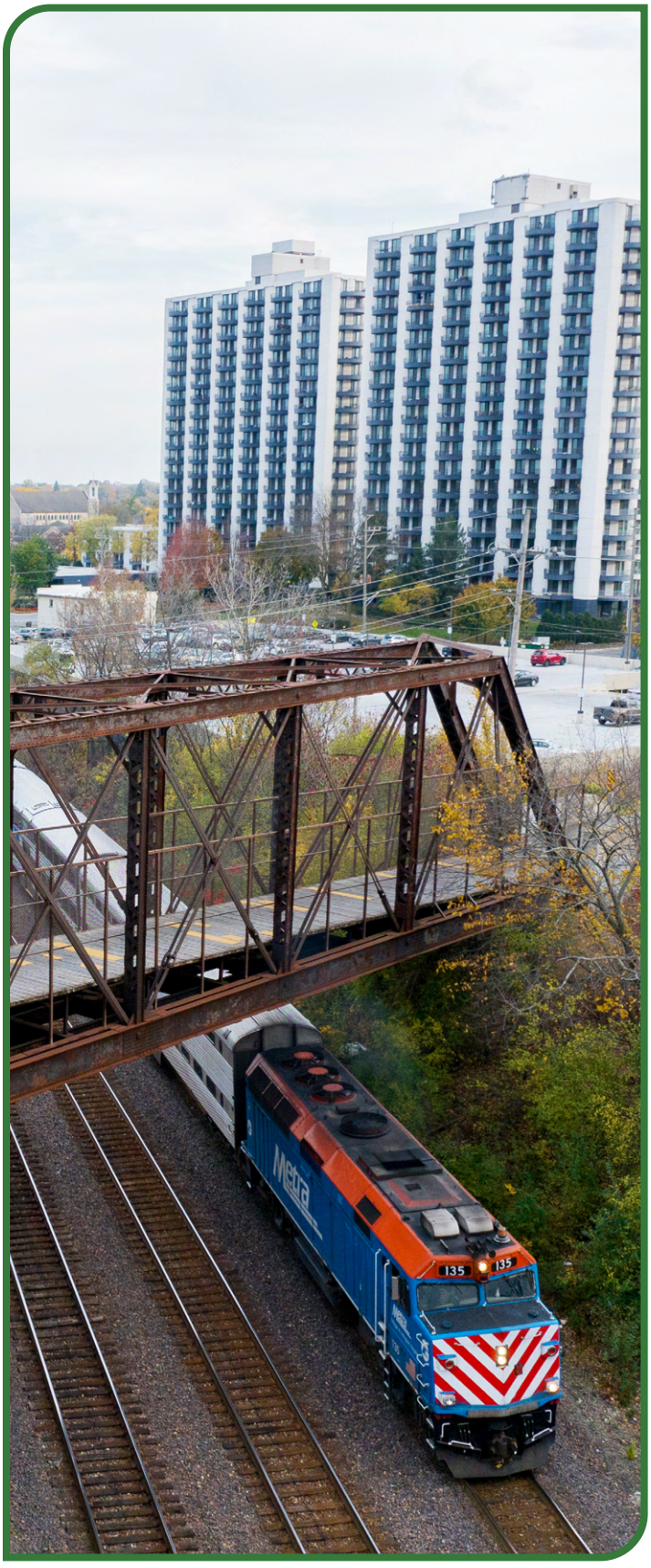
Advances in cleaner energy and energy efficiency contributed to reductions across the building, industry, and transportation sectors. However, changes in population, employment, and manufacturing production also contribute to these declines. Despite notable GHG reductions, greenfield development has reduced the region's potential to offset emissions through natural carbon sequestration (Table 2).

Table 2. Change in greenhouse gas emissions by sector (2005-2020)

Sector	GHG emissions (MMT CO_2e)		Percent change
	2005	2020	
Transportation	56.05	39.57	-29%
Residential buildings	35.08	26.12	-26%
Commercial buildings	31.56	27.87	-12%
Industry	65.15	55.95	-14%
Agriculture	2.13	2.14	+0.4%
Waste	2.95	2.64	-11%
Gross emissions	**192.92**	**154.27**	**-20%**
Natural sequestration	-3.57	-2.74	-23%
Net emissions	**189.35**	**151.53**	**-20%**

Note: 2005 water and wastewater emissions are included within the buildings and waste sectors due to limited data availability for these sources during that year.

Source: CMAP 2020 GHG Inventory, 2024.



Energy generation

Coal's share of the region's electricity mix fell sharply between 2005 and 2020, dropping from roughly half or more of each state's generation to well under half, as natural gas and renewables expanded.[20] Renewables grew from under 1 percent of Illinois and Indiana's energy mixes and just below 5 percent of Wisconsin's in 2005 to as much as 8 to 10 percent of the states' energy mixes in 2020.[21] This change contributed to reductions in building and industry emissions from electricity use. Illinois' electricity mix is also distinguished by its large nuclear fleet, which supplied nearly 58 percent of the state's generation in 2020 and helps keep grid emissions comparatively low.[22] However, continued reliance on natural gas use outside of the electric power sector remains a significant source of emissions, constraining overall regional reductions.

Commercial and residential buildings

Emissions from buildings saw the largest declines, reflecting cleaner electricity generation and efficiency improvements. In just 15 years, nearly 10 percent of the housing stock was newly built, likely to higher-efficiency standards given building code advancements, and appliance efficiency programs such as EnergyStar and WaterSense drove savings through replacements and retrofits.[23]

While the region's population declined by 3 percent, the number of households grew by 12 percent, resulting in an increase in new homes.[24] Employment increased by 12 percent during this same period, with growth in service industries and declines in manufacturing.[25]

Transportation

Transportation emissions fell 29 percent from 2005 to 2020, driven by improved fuel efficiency and an 11 percent drop in vehicle miles traveled (VMT),

mainly in Cook County.[26] While regional VMT has leveled off since 2000, outer counties in Illinois continue to see growth.[27] Efficiency gains have been partly offset by the shift toward larger vehicles, now the top on-road emitters. Passenger trucks, SUVs, and pickups produce more emissions per mile despite becoming cleaner overall.[28]

Industry

Industrial emissions dropped 14 percent as several large regional facilities closed, reduced production, upgraded equipment, or shifted away from energy-intensive processes. Several steel mills, refineries, and lime production facilities noted substantial decreases in reported emissions, reflecting both reduced production and efficiency improvements.[29]

Natural sequestration

Despite a resurgence in tree planting and land preservation, sequestration potential decreased 23 percent as some previously forested lands, natural lands, and croplands were converted to developed landscapes, reducing carbon absorption.[30]

Trends by geography

Since 2005, emission trends have diverged across the region (Table 3). Illinois saw the largest drop, cutting 40.74 MMT CO_2e, while Indiana's emissions rose slightly by 4.05 MMT CO_2e. In Wisconsin, Kenosha County's emissions fell, largely due to the closure of an industrial facility.

Table 3. Greenhouse gas emissions in Greater Chicago by state (2005-2020)

State	GHG emissions (MMT CO_2e)		Percent change
	2005	2020	
Illinois	139.01	98.27	-29%
Indiana	46.56	50.61	9%
Wisconsin	3.78	2.65	-30%
Totals	**189.35**	**151.53**	**-20%**

Source: CMAP 2020 GHG Inventory, 2024.

03

The path forward

This plan sets an ambitious economywide target of reducing gross GHG emissions by **48 percent from 2005 levels by 2035 and 86 percent by 2050,** excluding negative emissions.[31] Achieving an 86 percent reduction equates to cutting an additional 128.61 MMT CO_2e of annual emissions by 2050 — an average of 4.29 MMT CO_2e per year.

The necessary reductions set forth in this plan align with national modeling, which assumes 75 to 85 percent gross reductions by 2050, with remaining emissions offset through carbon sequestration.[32] Similarly, this plan seeks to maximize local natural sequestration while recognizing that greater potential exists elsewhere in the nation.

To support the region's GHG reduction targets, the plan evaluates three policy scenarios that illustrate the range of emissions reductions achievable under different levels of policy ambition and coordination (Figures 6 and 7):

- **Current policy scenario:** *Projects a 26 percent reduction in emissions by 2035 and 36 percent by 2050, which represents a business-as-usual trajectory.* This scenario reflects the impact of existing state-level policies, primarily Illinois' Climate and Equitable Jobs Act (CEJA), and identifies the remaining emissions gap that needs to be addressed by the plan. It accounts for recent federal policy changes but does not capture all local programs.[33]
- **Plan implementation scenario:** *Projects a 48 percent reduction in emissions by 2035 and 86 percent by 2050.* Building on the current policy scenario, it demonstrates how the region can achieve the economywide emissions reduction targets through more than 30 quantified strategies across 7 emission sectors.[34] Informed by existing work in the region, other states, and benchmarks from state or national modeling, this scenario requires ambitious actions across all government levels, including the reinstatement and advancement of federal policies supporting larger economic and technological shifts.
- **State and local implementation scenario:** *Projects a 37 percent reduction in emissions by 2035 and a 58 percent reduction by 2050.* A subset of the plan implementation scenario, this analysis highlights strategies that can be led by state and local actors, based on existing regional work or efforts adopted in other states. It demonstrates the potential of local and state action to contribute substantially toward overall emissions reduction.[35]

Further details on the scenarios and modeled emissions impacts are provided in Appendix C.

Figure 6. Plan implementation scenario emissions reductions by sector (2005-2050)

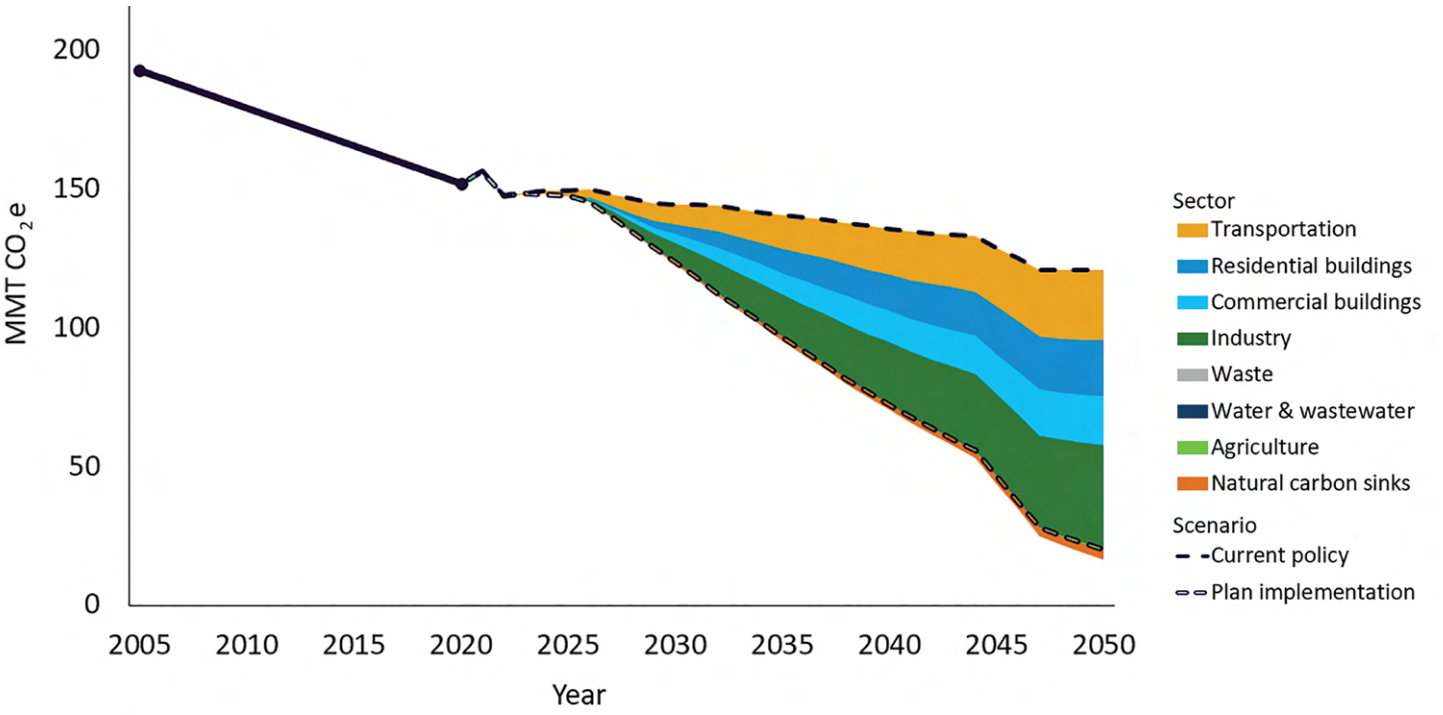
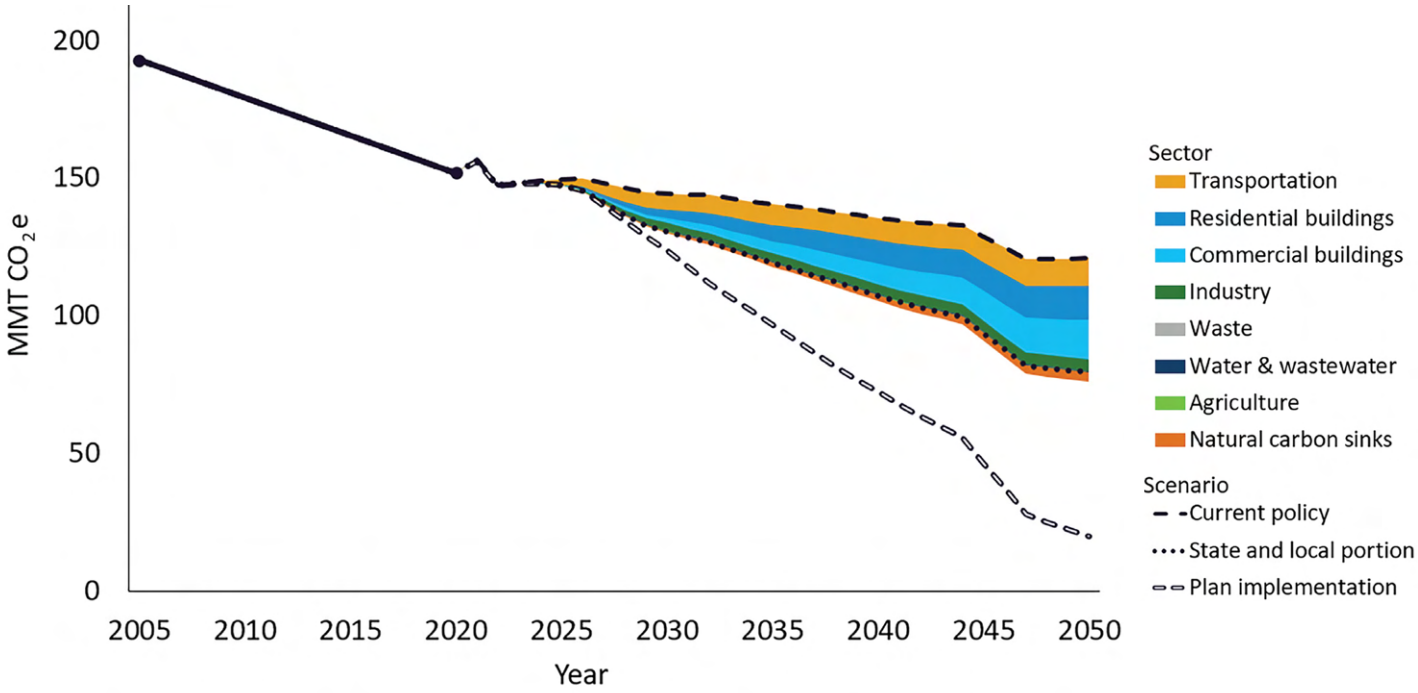


Figure 7. State and local implementation scenario emissions reductions by sector (2005-2050)



Note: Waste, water and wastewater, and agriculture emissions reductions are comparatively small and do not appear at the scale of the chart.

Source: CMAP and E3, 2025.

Sector reduction targets

Achieving the plan's overall emissions reduction target requires action across all sectors. Sector-specific targets reflect each sector's unique opportunities and challenges. In some areas, proven policies and technologies are ready to scale rapidly; in others, emerging solutions will take more time to mature (Table 4). Under the plan implementation scenario, the building and transportation sectors must achieve more than 90 percent reductions by 2050. Industry emissions, however, are projected to decline only by 77 percent, reflecting the longer timeline needed to scale new technologies and transform industrial supply chains.

Because energy use drives emissions across all sectors, the plan allocates energy generation emissions to each sector based on where the energy is ultimately used. Overall, emissions from energy generation are projected to decline by 98 percent by 2050, underscoring the pivotal role of a clean energy transition in achieving regional climate goals.

Table 4. Sector reduction targets to achieve plan implementation

Sector	GHG emissions (MMT CO_2e)				Reduction needed from (2005)	
	2005	2020	2035	2050	2035	2050
Buildings	66.64	53.99	36.54	3.35	-45%	-95%
Transportation	56.05	39.57	21.77	4.89	-61%	-91%
Industry	65.15	55.95	39.36	15.14	-40%	-77%
Waste	1.54	0.96	0.66	0.70	-57%	-56%
Waste and wastewater	-	1.70	1.10	0.57	-	-
Agriculture	2.13	2.14	1.56	1.56	-27%	-27%
Gross emissions	**192.92**	**154.27**	**100.48**	**26.23**	**-48%**	**-86%**

Note: Water and wastewater emissions are included within the buildings and waste sectors in 2005 due to limited data availability for these sources.

Source: CMAP and E3, 2025.

When considering state and local action alone, these sector outcomes shift significantly (Table 5). For example, industrial emissions are projected to decline by 33 percent, highlighting the fact that strategies in this sector are more reliant on federal policies and incentives to drive decarbonization. While state and local actions alone cannot achieve the full level of decarbonization required, strong leadership at these levels can drive substantial progress, especially in buildings, transportation, waste, water and wastewater, agriculture, and natural carbon sequestration sectors. The plan seeks to maximize natural carbon sequestration through state and local actions (Table 6).

Table 5. State and local sector reduction targets

Sector	Emissions (MMT CO_2e)				Reduction needed	
	2005	2020	2035	2050	2035	2050
Buildings	66.64	53.99	42.45	14.79	-36%	-78%
Transportation	56.05	39.57	26.59	20.27	-53%	-64%
Industry	65.15	55.95	49.68	43.96	-24%	-33%
Waste	1.54	0.96	0.66	0.70	-57%	-56%
Waste and wastewater	-	1.70	1.17	0.70	-	-
Agriculture	2.13	2.14	1.56	1.56	-27%	-27%
Gross emissions	**192.92**	**154.27**	**121.53**	**81.88**	**-37%**	**-58%**

Note: Water and wastewater emissions are included within the buildings and waste sectors in 2005 due to limited data availability for these sources.

Source: CMAP and E3, 2025.

Table 6. State and local scenario emission offsets by natural carbon sequestration

Sector	Emissions (MMT CO_2e)				Reduction needed	
	2005	2020	2035	2050	2035	2050
Natural carbon sequestration	3.57	2.74	4.15	6.25	16%	75%

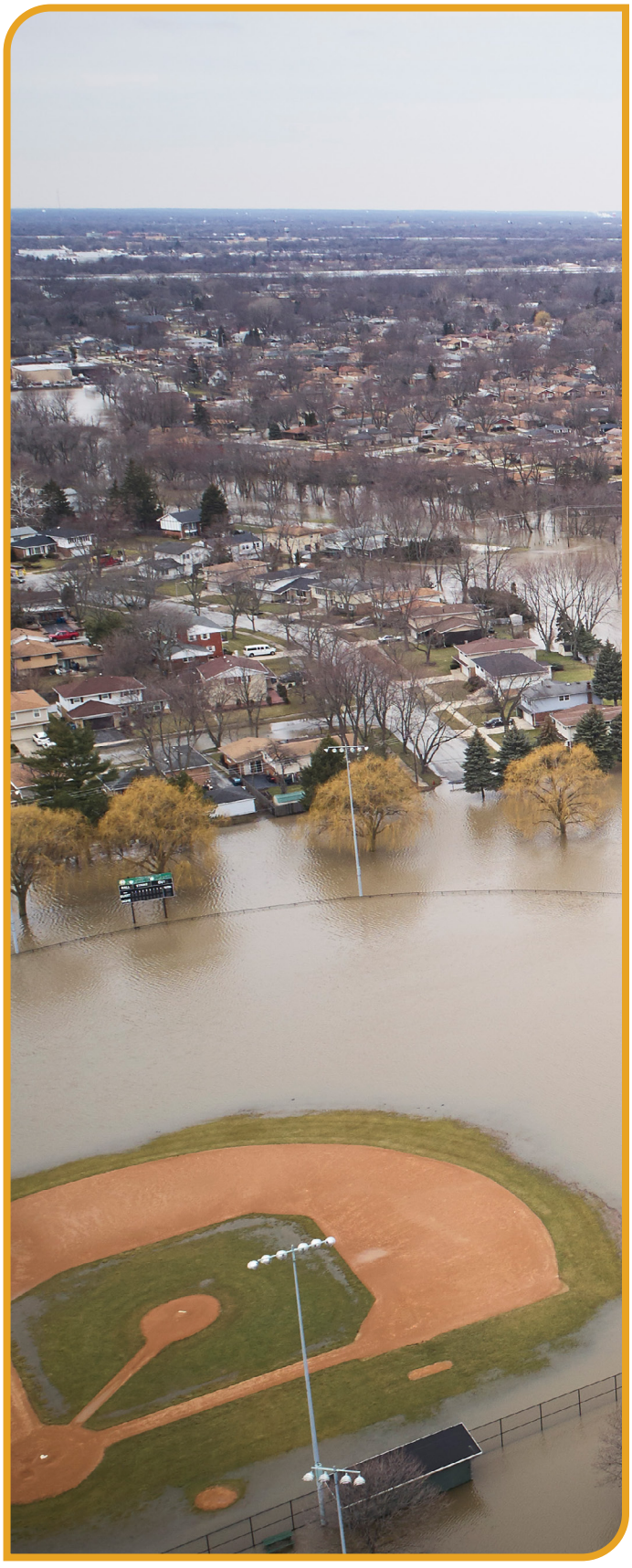
Source: CMAP and E3, 2025.

Reaching our goals

The region must act now to meet its reduction targets. Doing so requires coordinated action across every sector of the economy — and the work must accelerate. The pathway towards a clean economy — one that delivers healthier air, lower costs, and more resilient communities — depends on three important steps:

1. **Reduce energy demand** through efficiency, smarter land use, and enhanced transit service.
2. **Switch to electricity** across buildings, vehicles, and industry.
3. **Make electricity clean** by expanding renewable generation and modernizing the grid.

Each step reinforces the others, and success depends on working in partnership across all levels of government, business, and community.



What climate action looks like

With the comprehensive climate action plan fully implemented, Greater Chicago will be cleaner, quieter, healthier, and more connected — recognizably the same place, but fundamentally better for people.

By 2050, per-capita emissions will have dropped from just over 16 metric tons of CO_2e to about 3 metric tons, meeting the region's 86 percent reduction goal. Much of what makes the region vibrant today will remain, but powered and designed for a clean energy future:

- **Public health will improve across the region.** Cleaner air and more walkable, shaded neighborhoods will reduce respiratory illnesses, lower heat-related health risks, and improve quality of life, especially in communities historically burdened by pollution.

- **Homes and buildings across the region will be efficient, comfortable, and all-electric.** Retrofitted homes will save residents money on utility bills and improve indoor air quality. Heat pumps, induction cooktops, and efficient water heaters will be as common as today's furnaces and gas ranges.
- **Transportation will be cleaner and more accessible.** Most trips will take place in electric vehicles or on reliable, expanded transit. Roadway congestion and noise will decline, and the air will be measurably cleaner.
- **Industry and freight will have modernized their operations.** They'll use low-carbon fuels, electrified equipment, and efficient logistics networks, strengthening the region's position in a rapidly decarbonizing global economy.
- **Energy will come primarily from renewable sources,** with solar panels and community-scale battery storage common across rooftops, brownfields, and rights-of-way.
- **Natural systems, from restored prairies to reforested corridors and urban green infrastructure,** will capture carbon and make communities more resilient.
- **Jobs and opportunities will grow in new and existing fields.** Thousands of residents will be employed in clean construction, renewable energy, advanced manufacturing, and environmental restoration**.**

How do we get there

State and local leadership

Achieving the region's climate goals will depend on decisive action from all levels of government. While national leadership is essential to transform markets and accelerate needed technologies, state and local actors have the most direct influence over how change unfolds in communities. From energy codes and zoning to transportation planning and workforce development, their decisions determine the pace and shape of decarbonization.

Greater Chicago has already demonstrated what effective local climate action looks like. Cities and counties are piloting zero-emission fleet transitions, strengthening building energy codes, and expanding electric vehicle (EV) charging infrastructure. Programs such as the Metropolitan Mayors Caucus' EV Readiness Program and SolSmart have helped dozens of municipalities prepare for the clean energy transition, while new state policies — like Illinois' CEJA — are transforming the power sector and building a clean energy workforce. Cook County's program, Businesses Reducing Impact on the Environment, further advances this work by offering free on-site environmental assessments and grants for eligible small businesses to upgrade energy-, water-, and waste-efficiency systems, reduce pollution, and modernize operations across suburban Cook County.

The corporate sector is also a key driver of progress. Major employers, institutions, and industrial operators are increasingly investing in clean energy procurement, facility upgrades, fleet electrification, and supply chain commitments. Their scale and purchasing power can accelerate regional decarbonization, especially when aligned with public sector action.

These early successes show the power of local innovation and coordination. Scaling them across the 13-county region could cut emissions by nearly 60 percent by 2050, without additional federal policy support. To accomplish this, state and local governments will have to expand and align efforts across five key fronts:

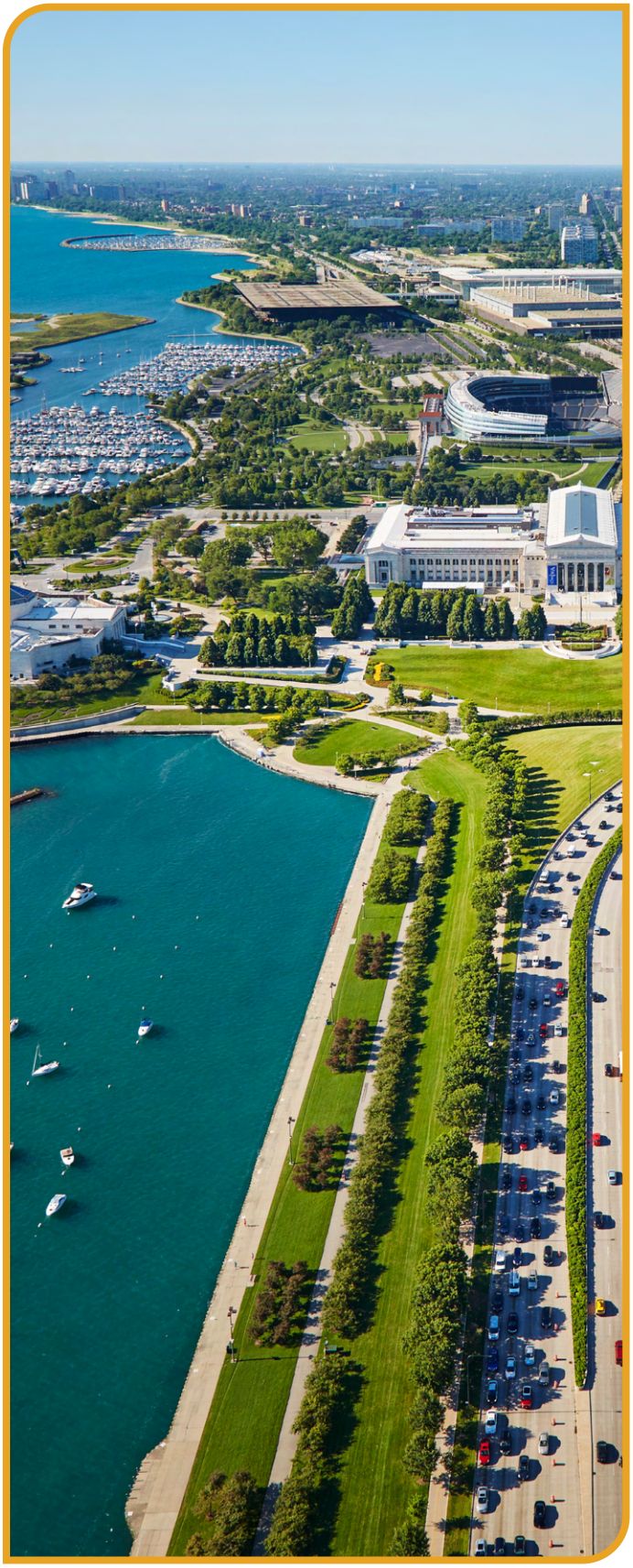
- **Policy reform and standards:** Strengthen building codes, set building performance benchmarks for existing buildings, establish facility emission limits, and promote compact, transit-oriented development.
- **Infrastructure and investment:** Accelerate deployment of renewable energy, grid modernization, public transit, building retrofits, and green infrastructure, such as the urban tree canopy.
- **Technical assistance and capacity building:** Provide resources, tools, and training to municipalities, businesses, and institutions to support implementation and compliance.
- **Public engagement and collaboration:** Partner with residents, community organizations, and the private sector to build trust, ensure fair and inclusive outcomes, and drive behavior change.
- **Private-sector leadership:** Support clean energy procurement, fleet electrification, industrial decarbonization, and voluntary sustainability commitments among major employers and manufacturers, leveraging their scale to accelerate progress.

Meeting the plan's goals requires significant investment, but the costs of inaction are far greater. Every dollar spent on clean energy, resilience, and efficiency avoids future losses from flooding, extreme heat, and air pollution. These investments also position the region to compete in a rapidly changing global economy that is moving toward cleaner technologies and lower emissions. Strategic investment now — supported by public funding, private capital, and federal programs — will pay long-term dividends in economic growth, energy security, and public health.

Federal leadership

Greater Chicago's successful transition to a clean economy cannot rely on state and local action alone. Achieving major emissions reductions requires federal leadership to ensure consistent standards, sustained investment, and coordinated infrastructure. Federal policies can create conditions that allow regional progress to become truly impactful.

Federal standards for vehicles, appliances, and power generation drive technological innovation and make clean options accessible and affordable across markets. Reinstating and strengthening programs such as zero-emission vehicle sales requirements, tax incentives for building weatherization and on-site energy generation, and funding for clean industrial breakthroughs will be essential to sustain market momentum. Stable, long-term policy signals give businesses and consumers confidence to invest, while federal financing and incentives help reduce costs for local governments, households, and small businesses — ensuring the benefits of the transition are widely shared.



As one of the world's largest metropolitan economies — and the third largest in the United States — Greater Chicago has a vital role to play in advancing and benefiting from the national clean energy transition. Continued federal partnership will allow the region to meet its goals faster, strengthen its economy, and demonstrate how coordinated action across all levels of government can create a cleaner, healthier, and more prosperous future.

Building the workforce for a clean economy

Transitioning to a clean economy will significantly reshape the regional labor market. Today, about 3.4 percent of the region's workforce — roughly 167,000 workers — is employed in occupations directly involved in decarbonization, including electricians, HVAC technicians, engineers, and construction trades (Table 7). Implementing the plan would require nearly doubling the workforce in these climate-critical occupations, adding nearly 168,000 new jobs through 2050. Even without additional federal action, the region would still see a 42 percent increase in these occupations with state and local plan implementation.

Most new jobs stem from upgrading existing buildings — retrofitting HVAC systems, improving energy efficiency, adding insulation, and installing electric appliances. More than 60,000 new jobs are tied to residential and commercial building improvements alone. The next largest area of expansion is electric grid modernization and energy transmission and distribution, which could grow from about 2,400 workers today to nearly 56,000 by 2050, reflecting the scale of investment needed to support electrification and renewable energy.

Not all sectors expand uniformly. The shift to EVs reduces the need for routine vehicle maintenance, leading to modest declines in automotive service jobs. However, those losses are partially offset by new work in EV charging infrastructure — planning, installation, and maintenance of charging stations — creating

thousands of new jobs accessible to electricians, technicians, and construction trades. Employment in low-emission industry and clean energy manufacturing also increases, particularly in advanced processes and energy efficiency.

CEJA has established a national model for workforce programs, creating pre-apprenticeships, contractor incubators, and 13 Clean Jobs Workforce Hubs that directly connect residents, including those from historically marginalized communities, to training and job placement. Similar programs in Indiana and Wisconsin are emerging, helping build a tri-state talent pipeline across the 13-county region. Unions, community colleges, and industry associations emphasize that apprenticeships remain the most reliable pathway into family-sustaining careers in the trades.

Workforce access is not the same across communities. Barriers such as limited English proficiency, lack of post-secondary education, and unemployment can limit residents' ability to participate in training and secure clean energy careers. To prevent new investments from reinforcing existing inequalities, the region must expand wraparound supports (transportation, childcare, bilingual/ESL instruction) and apply job-quality standards, such as prevailing wage, project labor agreements, and registered apprenticeship utilization, and, where applicable, measurable local hire and reporting requirements that connect residents to project opportunities. These measures help ensure that new jobs are high quality and accessible to all.

Workforce planning must begin now. Even with strong programs in place, the region faces persistent labor shortages — particularly in HVAC, electrical, and skilled construction trades — and these shortages could slow project delivery if not addressed proactively. Aligning workforce pipelines with climate investments will help ensure residents benefit from new opportunities while strengthening the region's economic competitiveness. A coordinated strategy, anchored in job quality, fair access, and long-term training capacity, will be critical to achieving both climate and economic goals. See Appendix E for more details on the workforce planning analysis.

Table 7. Current employment (2023) and projected workforce needs by industry subsector by 2050

Subsector	Current employment	Plan implementation			
		Number of new jobs	Percent change	State and local action only	
				Number of new jobs	Percent change
Agriculture and working lands	1,023	31	3%	31	3%
Charging stations	n/a*	3,389	n/a	635	n/a
Commercial HVAC	14,607	14,143	97%	12,203	84%
Commercial other	16,449	17,387	106%	9,626	64%
Industry	88,898	51,615	58%	9,033	10%
Residential HVAC	14,992	15,964	106%	9,626	64%
Residential other	5,089	5,731	113%	3,147	62%
Residential shell	3,925	6,904	176%	3,099	79%
Renewable energy generation	58	8,826	15,217%	484	834%
Transmission and distribution	2,421	55,967	2,312%	17,964	742%
Transportation	17,267	-11,720	-68%	-1,772	-10%
Waste	2,713	2	0%	2	0%
Total	**167,442**	**168,239**	**100%**	**70,135**	**42%**

* NAICS does not currently capture this industry as a distinct industry, making current employment difficult to assess.

Source: CMAP analysis of Bureau of Labor Statistics employment by NAICS and E3 projected jobs, 2025.

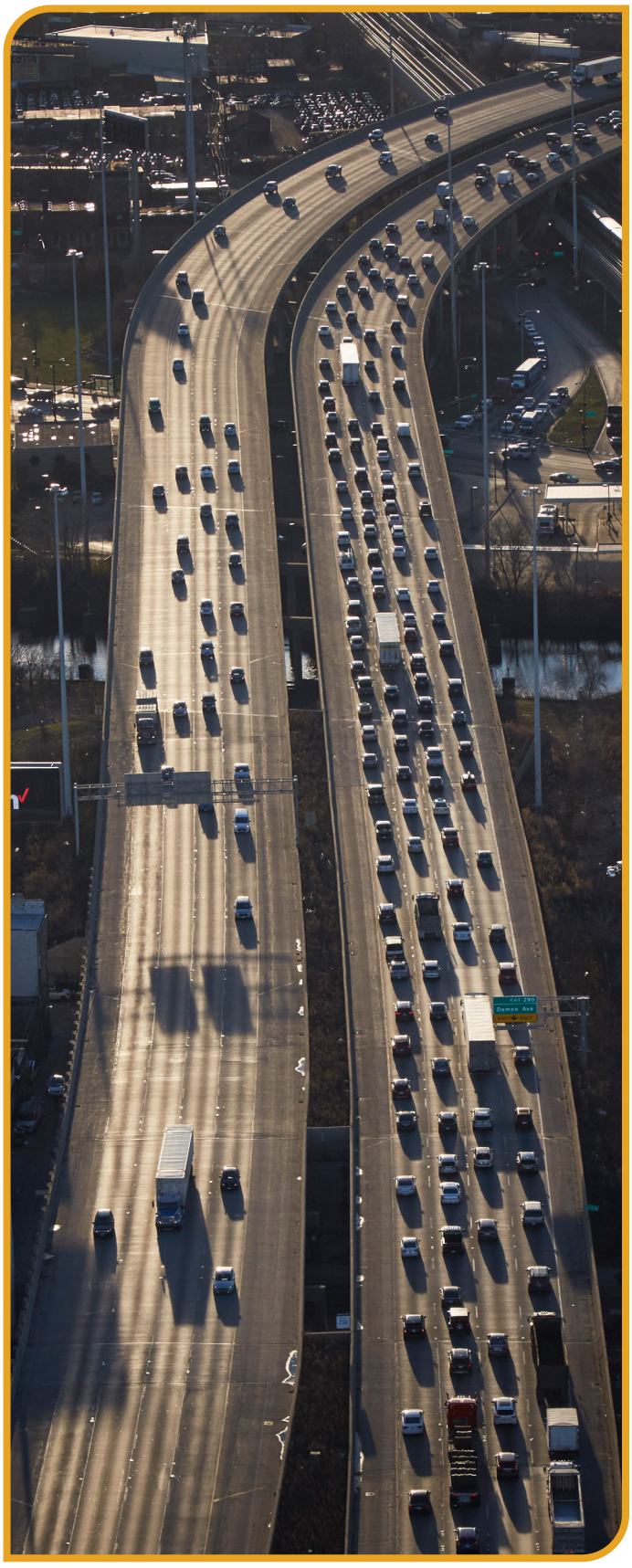
Maximizing community benefits

Drastically reducing GHG emissions across Greater Chicago can help tackle everyday challenges impacting the region's communities, including harmful air pollution, high energy costs, poor access to transportation options, and devastating flooding and heat waves. Taking the steps necessary for a clean economy can achieve regional priorities, whether better health, lower utility bills, or stronger infrastructure.

Air quality

Clean air is critical to human and environmental health. Many activities that generate GHG emissions — burning fossil fuels for power generation, transportation, and industrial activities — also degrade air quality by releasing pollutants into the air. The major sources of regional GHG emissions — from transportation, industry, and buildings — also release some of the highest levels of federally regulated criteria pollutants, including nitrogen oxide, ozone, volatile organic compounds, and fine particulate matter. Implementing climate strategies aimed at reducing GHG emissions will also deliver immediate, local air quality benefits. These actions are especially important as a warming climate is expected to worsen ozone pollution by lengthening the ozone season and increasing the number of days with ozone-conducive conditions.

Eleven of the 13 counties covered in the plan do not meet the USEPA's ground-level ozone standards, meaning that ozone levels do not meet Clean Air Act standards intended to protect human health. Portions of the region may soon have the same designation for fine particulate matter (PM2.5), as levels exceed the 2024 revision to PM2.5 standards and may trigger further regulatory action.



Current pollutant levels make the region among the most polluted metropolitan areas in the U.S. In 2025, the region was ranked the 13th most polluted metropolitan area for PM2.5 and 15th for ozone, out of over 200 metropolitan areas.[36] Both ozone and PM2.5 are closely tied to the combustion of fossil fuels and contribute to increased risks of asthma, respiratory illness, heart disease, and premature death. While regional pollution has generally decreased since USEPA monitoring began, reductions, especially in PM2.5 and ozone, have largely stagnated over the past decade.

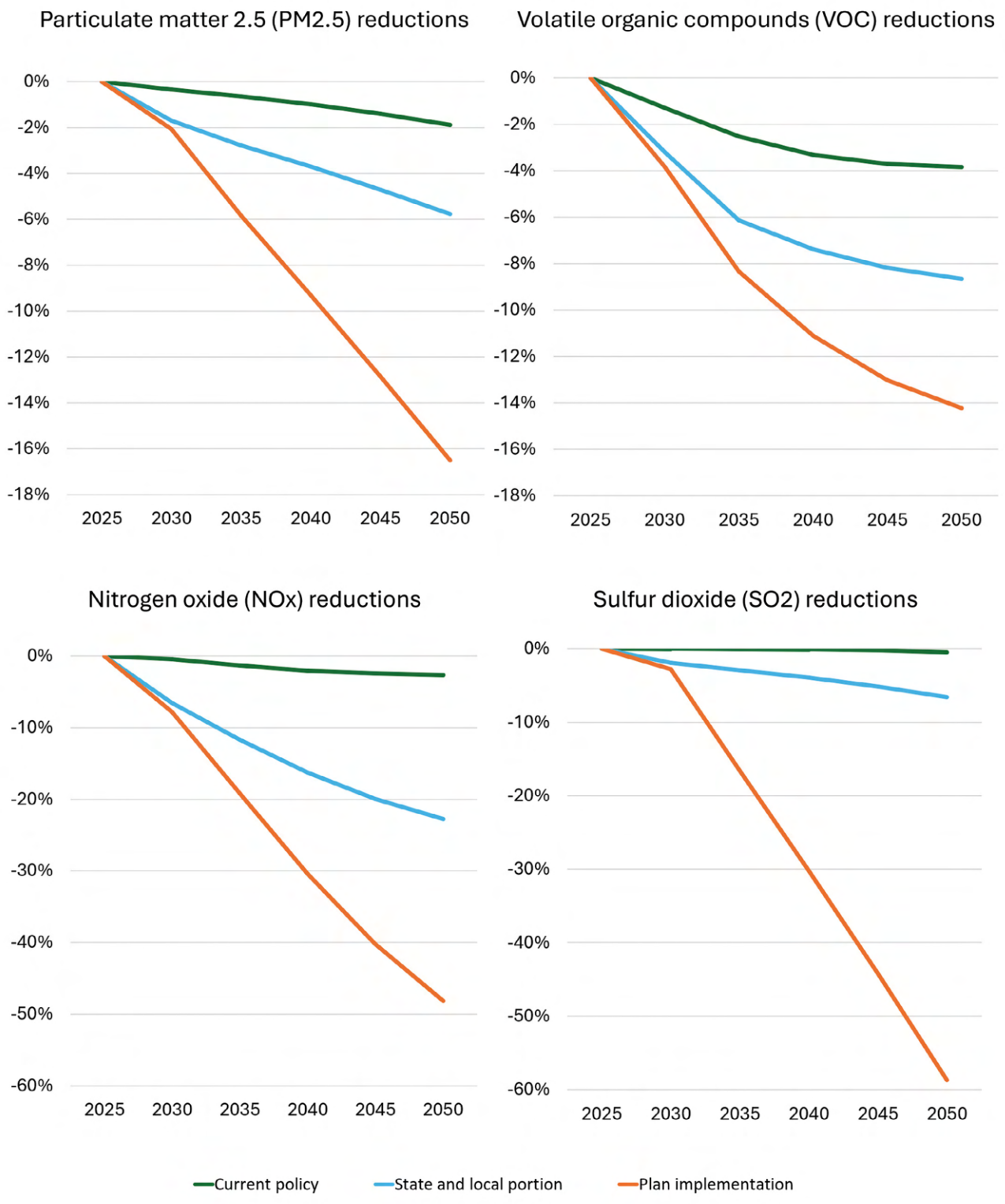
Not all air pollution originates within the region, posing additional challenges to improving air quality. Extreme weather events, increasingly driven by climate change, can degrade air far from their source. Smoke from Canadian wildfires in the summers of 2023 and 2025, for example, spread across much of the Midwest, producing visible haze and Air Quality Index levels exceeding 200 ("very unhealthy"). Wildfire smoke carries high levels of particulate matter and ozone precursors, highlighting the need for coordinated mitigation and adaptation strategies to both reduce emissions and protect public health from worsening air quality.

How does the plan impact air quality?

The strategies outlined in this plan would reduce pollutants and improve air quality across Greater Chicago (Figure 8). In the current policy scenario, reductions in PM2.5, nitrogen dioxide, sulfur dioxide, ammonia, and volatile organic compounds (VOCs) by 2050 are modest, ranging from 0.5 percent to 3.8 percent, continuing the slow progress we have seen in recent years.

In the plan implementation scenario, reductions become more significant as major emissions sources fully transition to clean energy. In 2035, the region sees 5.9 to nearly 20 percent reductions in all modeled pollutants. By 2050, regional nitrogen dioxide, sulfur dioxide, and ammonia see the largest decreases, ranging from 34 percent to 58.7 percent, and PM2.5 and VOCs decrease by 16.5 and 14.2 percent, respectively.

Figure 8. Criteria air pollutant reductions by scenario (2020-2050)



Source: CMAP analysis of Bureau of Labor Statistics employment by NAICS and E3 projected jobs, 2025.

What are criteria pollutants and how are they harmful to our health?

The combustion of fossil fuels emits dangerous pollutants. To protect our health and safety, the Clean Air Act requires the USEPA to set limits for and monitor six pollutants and several of their precursors.[37]

Nitrogen oxides are gases formed from burning fossil fuels, mainly by residential natural gas use and diesel-powered motor vehicles. They cause respiratory problems and contribute to ground-level ozone, fine particulate matter (PM2.5), and acid rain, posing risks to public health, ecosystems, and infrastructure.

Ground-level ozone forms when nitrogen oxides and volatile organic compounds react in sunlight. As a major component of smog, it poses serious health risks, including coughing, throat irritation, reduced lung function, and aggravated asthma, especially for children, older adults, and people with pre-existing respiratory conditions. Ozone pollution also worsens heat-related stress and strains healthcare systems during warmer months, when levels tend to be highest.

Volatile organic compounds are carbon-based gases emitted from motor vehicles, industrial processes, solvents, and products such as paints and cleaning agents. Some are directly harmful to health and are precursors to ground-level ozone and PM2.5. Short-term exposure can cause eye, nose, and throat irritation, while long-term exposure is linked to liver and kidney damage and increased cancer risk.

Fine particulate matter consists of airborne particles 2.5 microns or smaller, mainly from commercial cooking, residential wood combustion, metal manufacturing, construction, and road dust. These tiny particles can penetrate deep into the lungs, causing respiratory infections, asthma, cardiovascular disease, and other long-term health conditions.

Sulfur oxides, primarily sulfur dioxide, are emitted from power plants and industrial fossil fuel combustion. They irritate the respiratory system and are especially harmful to people with asthma or other chronic respiratory conditions.

Ammonia is a colorless, pungent gas emitted from waste disposal and treatment facilities as well as on-road vehicles, due to ammonia slip from catalytic converters. In the atmosphere, it reacts with nitrogen oxides and sulfur oxides to form PM2.5, contributing to respiratory and cardiovascular risks.

Carbon monoxide is a colorless, odorless gas from incomplete fossil fuel combustion. Outdoor sources include motor vehicles, small engines, and industrial processes, while indoor sources include gas stoves, furnaces, and generators. High carbon monoxide levels reduce the body's ability to transport oxygen, which can harm the heart and brain. Outdoor exposure is usually low, but indoor accumulation in poorly ventilated spaces can be dangerous or even fatal.

Lead is a naturally occurring metal that enters the air mainly through ore and metals processing. Inhaled lead travels through the bloodstream and can damage the nervous system, kidneys, and cardiovascular system.

Public health

Air pollution is a leading environmental risk to public health, contributing to chronic conditions, increased health care costs, and premature deaths. Short-term exposure can cause eye, nose, and throat irritation, reduce lung function, and trigger asthma attacks, heart attacks, and emergency room visits. Long-term exposure increases the risk of heart disease, certain cancers, cognitive impairment, and premature death.[38]

Communities across Greater Chicago continue to experience significant health impacts from air pollution. In Chicago, exposure to PM2.5 contributes to an estimated 5 percent of premature deaths each year.[39] Across the broader region (excluding La Porte and Porter counties), diesel-related PM2.5 exposure is projected to cause nearly 360 deaths, 177 heart attacks, 4,595 cases of asthma exacerbation, and 22,731 lost workdays in 2026 — resulting in over $4 billion in associated health and productivity costs.[40] Within Cook, DuPage, Kane, Lake, McHenry, and Will counties in Illinois, nitrogen dioxide emissions from medium- and heavy-duty vehicle exhaust are linked to roughly 1,330 premature deaths annually and 1,580 new pediatric asthma cases each year.[41]

Pollution-related health burdens are not evenly distributed, disproportionately affecting low-income communities and communities of color. These communities are more likely to live near transportation corridors and industrial facilities that emit high levels of air pollutants and often have limited access to health care and other resources, increasing their vulnerability to pollution-related health burdens.[42] High pollution burdens also limit economic opportunity by undermining residents' ability to live healthy, productive lives — a challenge that affects the region's overall economic competitiveness.

What we heard from the community: Air quality and public health

During the planning process, residents across the region emphasized clean air and public health concerns as their top priorities, especially those living near manufacturing facilities and freight corridors. Many described the toll of constant exposure to harmful air pollutants, with entire families affected by asthma and other chronic health conditions. Others noted that people often move to live near these businesses because they depend on them for jobs, and may be unaware of potential health impacts, underscoring the need to balance economic opportunity with health protection.

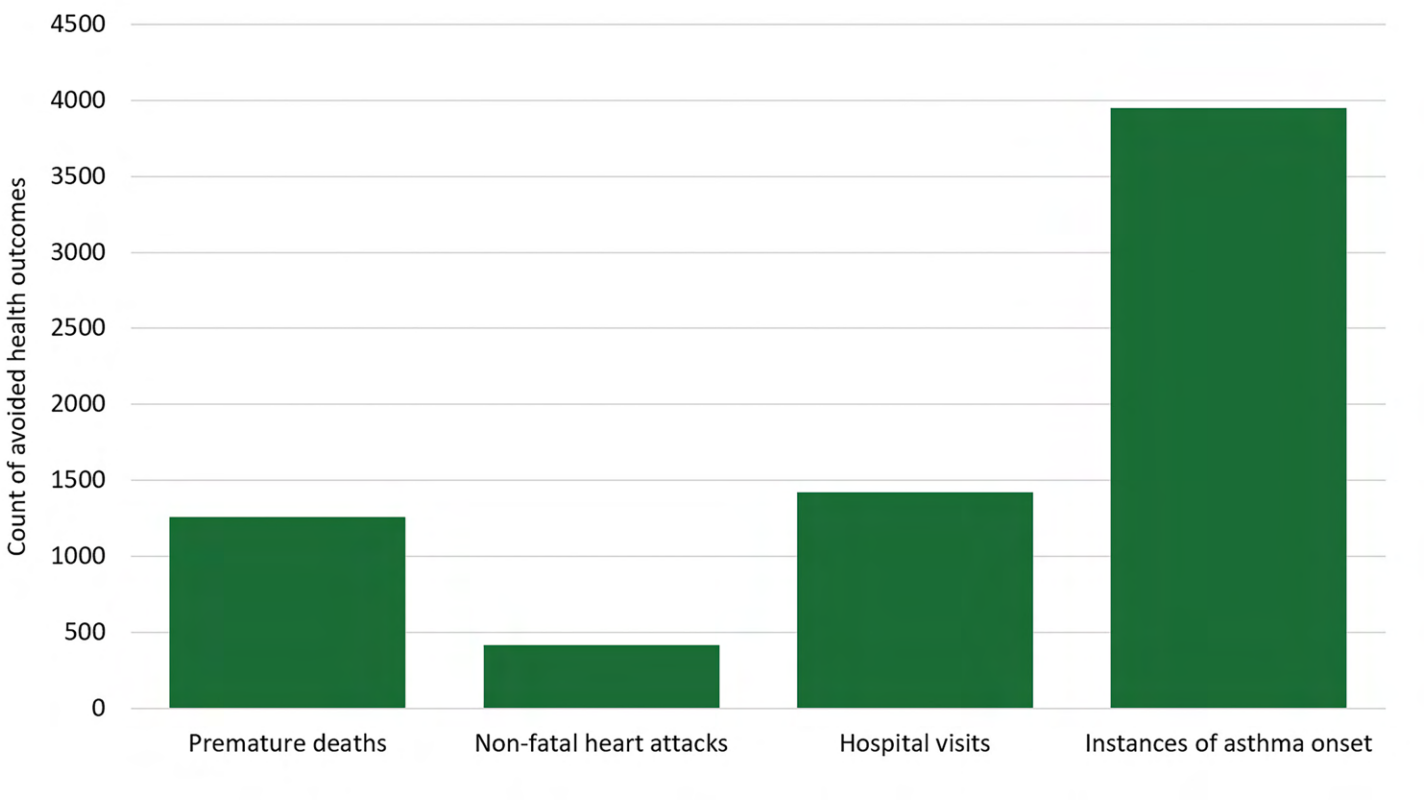
Residents also raised growing concerns about worsening air quality from wildfire smoke (which increasingly forces people indoors during summer months) and about poor indoor air quality in older industrial buildings and homes damaged by flooding and mold. Together, these experiences highlight how closely air quality, health, and economic well-being are intertwined across Greater Chicago.

How will the plan improve public health?

Implementing the strategies in this plan would significantly improve regional air quality, public health, and economic wellbeing (Figure 9). Under the plan implementation scenario, the region could avoid on average 1,250 premature deaths each year from PM2.5 and ozone exposure, saving an estimated $2.3 to $3.6 billion annually in health care costs and lost productivity (Table 8). Nearly 4,000 new asthma cases, more than 400

non-fatal heart attacks, and 1,500 pollution-related emergency room visits could also be prevented each year. Altogether, the plan could avert over one million pollution-related health events across Greater Chicago each year. Additional public health benefits, such as those from increased active transportation, could occur but are not included in the model. Improved air quality, safer outdoor environments, and greater access to green and natural spaces can also reduce stress and anxiety, support mental well-being, and strengthen community health.

Figure 9. Annual avoided health outcomes in 2050 under the plan implementation scenario



Source: CMAP and E3, 2025.

Table 8. Public health benefits gained under plan implementation relative to current policy (billions of dollars)

Scenario	2025	2030	2035	2040	2045	2050
Plan implementation	$0.02	$0.69	$1.54	$2.31	$3.01	$3.62
State and local portion	$0.02	$0.67	$1.22	$1.66	$2.04	$2.33

Source: CMAP and E3, 2025.

Health impacts from air pollution

Exposure to air pollutants poses serious risks to human health. Even short-term exposure can cause respiratory symptoms, cardiovascular complications, and infections, especially for those with pre-existing conditions. Some of the most common pollution-related health impacts are detailed below.

Premature deaths: Premature death due to air pollution typically refers to deaths that would not have occurred for years if the air were cleaner. Exposure to PM2.5 can lead to deaths that would otherwise occur years later, primarily from respiratory and cardiovascular causes.[43]

Respiratory conditions: Air pollution worsens asthma, bronchitis, and COPD, especially in children, older adults, and those with pre-existing conditions.[44] Ozone inflames airways, while PM2.5 penetrates deep into the lungs.

Cardiovascular disease: PM2.5 enters the bloodstream, causing inflammation and arterial damage, increasing the risk of heart attacks, strokes, and high blood pressure.[45]

Dementia and cognitive decline: Emerging research has linked PM2.5 and ozone exposure to higher risks of Parkinson's disease, Alzheimer's disease, and cognitive decline in older adults.[46]

Diabetes: Long-term exposure to air pollution can contribute to type 2 diabetes by increasing oxidative stress and insulin resistance and heightens vulnerability to other health risks.[47]

Birth and development outcomes: Pregnant people and infants are particularly vulnerable; exposure to PM2.5 and ozone increases risks of preterm birth, low birth weight, infant mortality, and impaired child neurological development.[48]

Hospital visits: Pollutant exposure drives more emergency room visits and hospital admissions for respiratory and cardiovascular issues, especially during high-smog days or wildfire smoke events.[49]

Reduced work productivity: Poor air quality leads to missed workdays, lower cognitive performance, and suppressed physical activity, especially for outdoor workers and those with pre-existing conditions.[50]

Additional benefits of climate action

Actions to reduce GHG emissions provide many benefits beyond direct improvements to air quality and public health. Understanding desired co-benefits prioritized by the region's residents can improve strategy design and build broad support for action.

During the planning process, community members shared which co-benefits matter most. While air quality and health consistently ranked high, other frequently cited priorities included:

Safe and accessible bike and pedestrian infrastructure. Many residents noted a lack of safe sidewalks and trails, forcing people to bike or walk in the street alongside car traffic — which deters residents from these forms of transportation. Complete networks of accessible sidewalks, bike paths, and trails can reduce vehicle miles traveled, lower emissions, and promote healthier, more active lifestyles that many communities desire.

Safe, reliable, and accessible public transit. Community members reported limited transportation options, particularly for low-income families who rely on public transit. Issues include long waits, unsafe stops, and long commute times. Reliable, frequent, and safe transit reduces dependence on personal vehicles and expands mobility options — a higher priority for many residents than owning electric vehicles.

More trees and green spaces. Access to trees and natural areas is limited in many low-income communities, contributing to urban heat islands and poorer public health. Expanding and preserving green spaces can store carbon, improve air quality, lower local temperatures, support pollinators and wildlife, and provide spaces for urban farming and recreation. Maintenance support is critical to ensure these benefits endure, as community members noted a lack of capacity to maintain trees and natural spaces after they are planted.

Lower energy and water bills. Rising utility costs burden families, especially during extreme temperatures. Air conditioning is often considered a luxury, and many low-income or older residents cannot afford to use it or pay their utility bills. Residents are also concerned about how large increases in energy demand, like from data centers, could increase costs for all ratepayers. While energy-efficient appliances and home upgrades reduce electricity and water use and lower bills, the upfront installation costs are out of reach for many people. Financial assistance, incentives, and safeguards — such as protections against rent increases and utility rate hikes for both electricity and natural gas — are essential to ensure equal access to these benefits.

Reduced extreme weather risk. Residents highlighted the growing impacts of extreme heat and flooding, particularly in low-income neighborhoods with more impervious surfaces, less vegetation, and few places to escape conditions. Heatwaves and floods also threaten farms and community gardens and reduce yields. After storms, some residents feel their neighborhoods are the last to have power restored or receive cleanup services, and note the high costs that their municipalities encounter to recover from events. Investments in natural areas and green infrastructure will not only sequester carbon but can also protect homes, livelihoods, and infrastructure while reducing community vulnerability.

Workforce opportunities. Community members noted the tension around the clean energy transition, often a critical community objective, and the current dependency on existing jobs in fossil fuel industries, protected by some labor organizations. Decarbonization and electrification present new employment opportunities, but community members stressed the need to connect training programs with actual jobs. By pairing workforce development with education and outreach, communities overburdened by pollution can benefit from cleaner air while accessing good jobs.

How each sector contributes

Achieving the region's climate goals requires deep, sustained action across every sector of the economy. Each sector — energy generation, industry, buildings, transportation, waste, water and wastewater, agriculture, and natural carbon sequestration — plays a vital role in shaping the region's future.

The following sector-specific chapters present existing conditions, targets and scenario results, and objectives and strategies required to reach those targets. A subset of strategies is modeled to illustrate the scale and pace needed to meet the economywide and sector-specific targets. Appendices D and E provide additional detail on the quantification methods, modeling assumptions, implementing agencies, milestones, schedules, metrics, funding sources, and cost estimates.

Together, these sector-specific chapters outline a clear and achievable framework for action. While no single strategy or sector can meet the region's targets alone, coordinated and sustained action across all sectors of our economy can deliver a cleaner, fairer, and more resilient future.

04

Energy generation

About this chapter

This chapter outlines the energy generation sector's role in achieving the region's reduction targets, including current conditions, scenarios, sector-specific reduction targets, and the key objectives and strategies needed to meet them. The strategies reflect a combination of state, local, federal, and private-sector actions, with select measures quantified to show the scale and pace of change required.

Energy generation objectives and strategies

1. Clean the electricity grid

- 1.1. Implement Illinois' Climate and Equitable Jobs Act
- 1.2. Advance clean electricity standards in Indiana and Wisconsin
- 1.3. Advocate for federal and regional energy market reforms
- 1.4. Support local renewable energy development

2. Modernize and expand grid capacity

- 2.1. Implement grid-enhancing technologies
- 2.2. Improve transmissions planning and siting
- 2.3. Increase distributed energy resource integration
- 2.4. Plan for emerging energy demands

3. Plan for the future of the natural gas industry

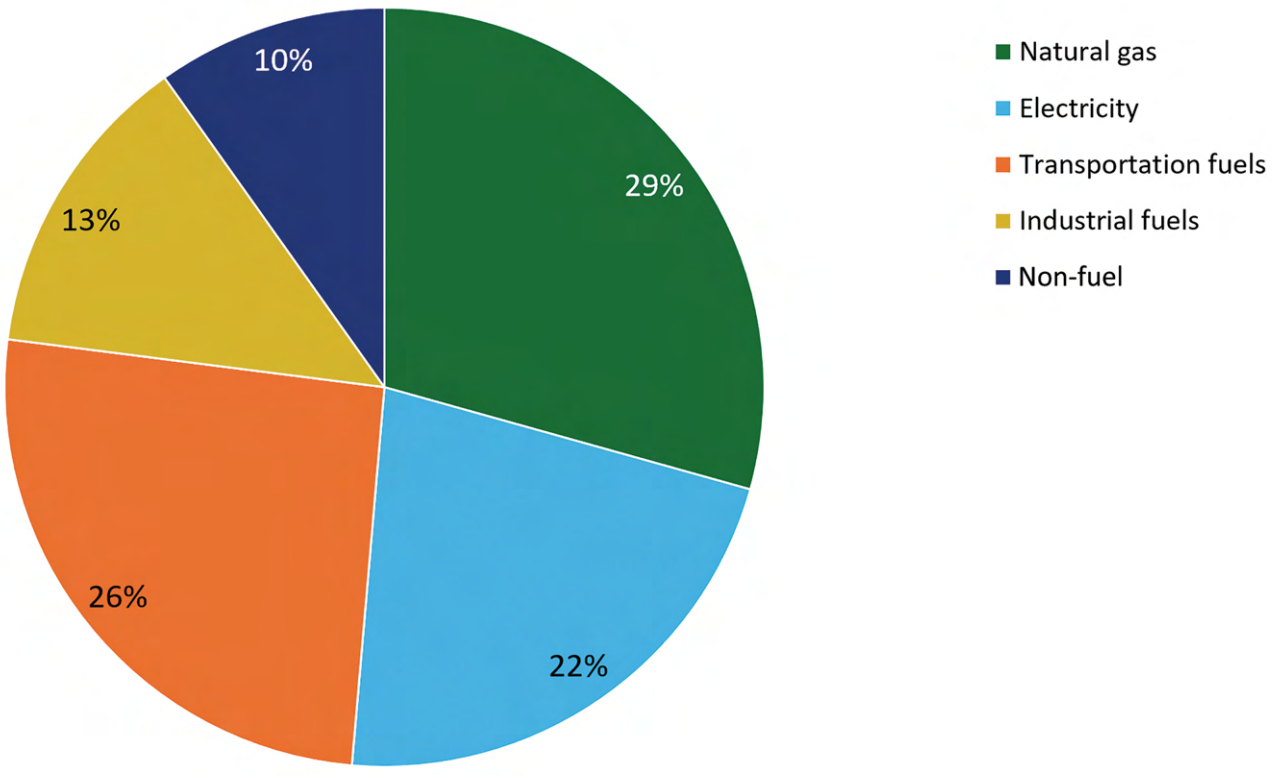
- 3.1. Adopt clean heat standards
- 3.2. Leverage renewable natural gas as a transition tool
- 3.3. Encourage natural gas utilities to transition to geothermal energy utilities
- 3.4. Invest in repairing broken and leaking gas pipelines and infrastructure

Transforming how electricity and natural gas are produced, delivered, and used is essential to achieving the region's climate goals. Together, these systems power homes, businesses, and infrastructure — but also account for over half of total regional emissions. Cleaning the electric grid, expanding and modernizing transmission, and planning for the future of the natural gas system are foundational to reducing emissions across every sector of the economy.

Energy systems drive more than half of regional emissions

The energy generation sector encompasses electricity generation, transmission, and distribution, along with the distribution and combustion of natural gas.[51] In 2020, these sources produced about 51 percent (78 MMT CO_2e) (Figure 10). The region's electricity is supplied by investor-owned, municipal, and cooperative utilities drawing from a mix of coal, natural gas, nuclear, and renewable energy. Illinois generates more than half of its electricity from nuclear power and 14 percent from renewables, while Indiana and Wisconsin continue to rely heavily on fossil fuels, with renewables contributing less than 10 percent (Figure 11).

Figure 10. Emissions breakdown by source, 2020



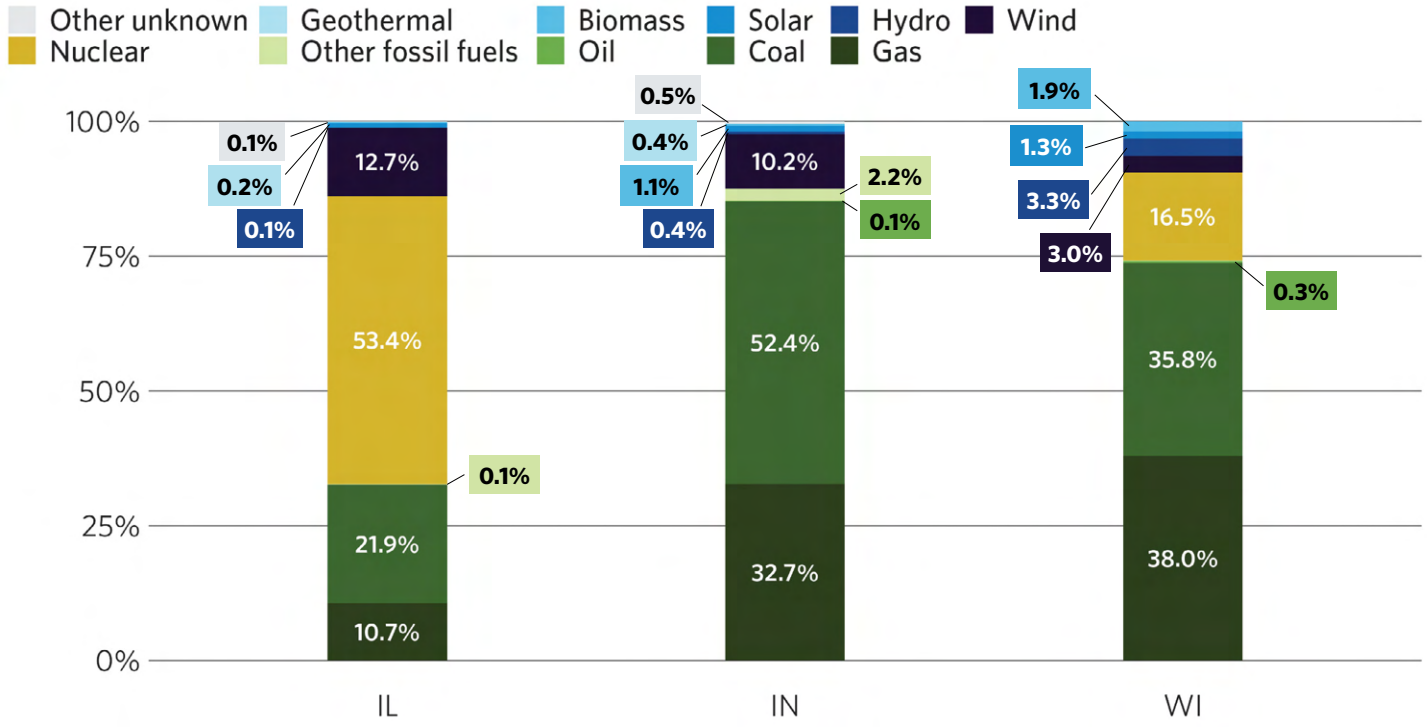
Note: The non-fuel category includes emissions from sources other than fuel combustion, such as landfills and industrial processes.

Source: CMAP 2020 GHG Inventory, 2024.

Natural gas remains a major emissions source

Natural gas utilities also play a major role in the region's emissions. Beyond supplying gas to power plants, they serve residential, commercial, and industrial customers for space and water heating, commercial uses, and manufacturing processes. Emissions come not only from burning gas in homes and businesses but also from methane leaks throughout the extensive pipeline network — highlighting the importance of planning for a managed transition that maintains reliability while reducing system-wide emissions.

Figure 11. Energy mix across Greater Chicago by state, 2022



Note: The Other fossil fuels category includes those that cannot be categorized as coal, oil, or gas, such as blast furnace gas, hydrogen, tire-derived fuel, or the nonrenewable portion of solid waste. The Other unknown category includes fuel sources that are unknown to the USEPA, are purchased by facilities from external sources, or waste heat.

Source: CMAP analysis of USEPA eGRID data.

Electrification will reshape future energy demand

Looking ahead, demand is projected to rise significantly as more homes, vehicles, and industries electrify. ComEd, which serves most of the region, forecasts a 110 percent increase in electricity demand over the next 20 years, driven by steady electrification and the growth of data centers and other high-load users.[52] At the same time, natural gas use will remain a major source of emissions until building and industrial heating systems transition to cleaner alternatives. The pace of this dual transition — away from fossil fuels and toward clean electricity — will determine the region's emissions trajectory for decades.

Renewable energy technologies are rapidly becoming more affordable and reliable, positioning the region for accelerated progress. Wind and solar are now among the lowest-cost sources of new generation and, when paired with battery storage, they can provide dependable power while improving grid flexibility and resilience. With coordinated regional planning and investment, these technologies can replace aging fossil fuel assets, stabilize long-term costs, and strengthen energy independence across the region.

Federal and state programs, such as the IRA and CEJA, have accelerated the region's clean energy transition, building on longstanding frameworks like the Clean Air Act and the USEPA's endangerment finding.[53] However, recent shifts in federal priorities, expiring tax credits, higher material and financing costs, and continued supply chain disruptions risk slowing deployment. Local permitting barriers for renewable and transmission projects further constrain progress, delaying critical upgrades needed to integrate new clean energy resources. Although substantial renewable expansion occurred in 2025, the full effects of declining federal support are expected to emerge in 2026 and beyond.

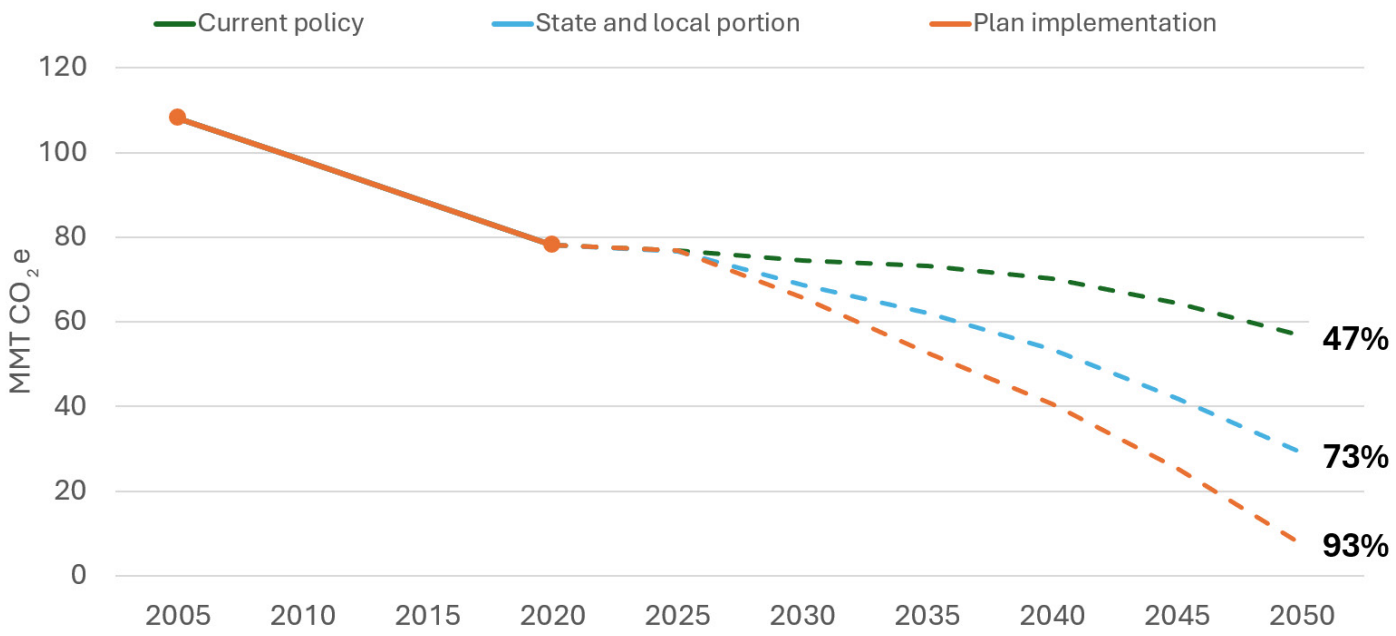
Delivering a clean energy system requires coordinated action

To realize a clean, reliable, and affordable energy system, the region must overcome persistent challenges. Increasing wind and solar power requires addressing interconnection delays and expanding transmission capacity to ensure reliable delivery without raising costs for customers. Meanwhile, energy affordability remains a concern, particularly for low-income households that already face high utility burdens. Communities historically impacted by fossil fuel pollution may face new economic challenges as power plants and pipelines are retired. For the region to succeed, grid modernization, renewable investment, and workforce development must happen in a way that is fair and maintains reliability and affordability.

Reaching the 2050 target

The energy generation sector must reduce emission by 93 percent from 2005 levels by 2050 to align with regional climate goals. Achieving those goals requires transforming how electricity is generated, transmitted, and used. Greater Chicago has an enormous opportunity to lead in clean energy deployment; it could generate more than 12 times its current electricity demand.[54] Falling costs for renewables and battery storage make this transition both achievable and economically advantageous. With sustained investment in grid modernization and coordinated leadership across jurisdictions, the region can build a clean, affordable, and resilient energy system that reduces pollution, protects public health, and benefits all communities.

Figure 12. Greenhouse gas emissions from electricity and natural gas use by scenario, MMT CO_2e (2005-2020), and percent reduction from 2005 levels by 2050



Source: CMAP and E3, 2025.

Current policy scenario

If no new policies are adopted, energy generation emissions are expected to fall 47 percent by 2050, progress driven primarily by Illinois' cleaner electricity under CEJA (Figure 12). However, this is not enough progress to meet long-term climate goals, particularly given a projected 14 percent increase in natural gas-related emissions. While CEJA curbs electricity-related emissions, deeper electrification and additional clean energy investments are needed to achieve broader systemwide reductions.

Plan implementation scenario

This scenario achieves the 93 percent reduction target, based on three objectives:

1. Clean the electric grid.
2. Modernize and expand the capacity of the electric grid.
3. Plan for the future of the natural gas industry.

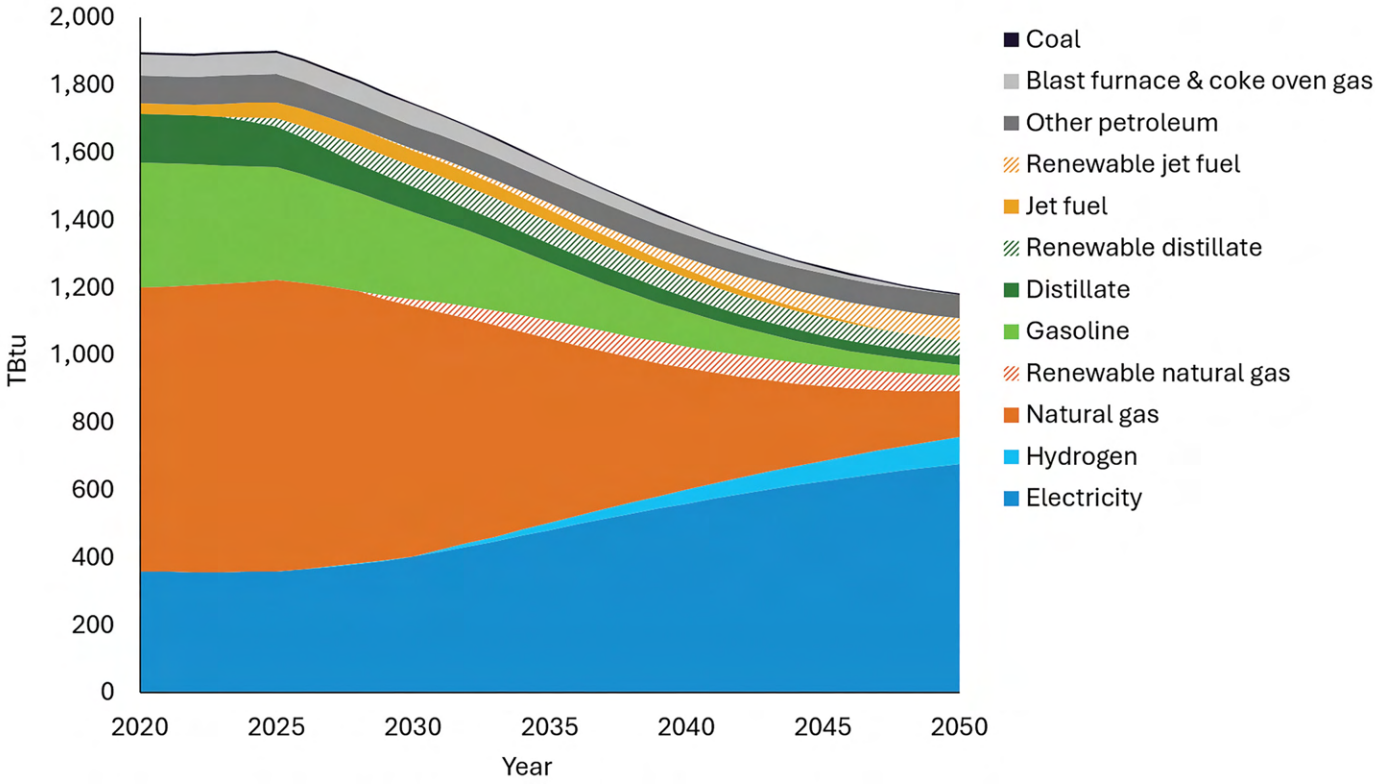
Modeled reductions from 2 of the 11 critical strategies drive these outcomes.[55] Achieving this target will depend on fully implementing CEJA, sustained federal incentives, and major investments in transmission, renewable generation, and modern grid management. Success will also require proactive planning for new sources of electricity demand, from building and vehicle electrification to new high-load users.

Figure 13 illustrates how fuels meet regional energy demand under the plan implementation scenario. Over time, electricity replaces natural gas as the primary energy source, while total energy demand declines due to efficiency gains and conservation. Implementing the modeled strategies would increase electricity demand by 317 Trillion British thermal units (TBtus) (88 percent above 2020 levels), reflecting plan-driven electrification only and excluding other potential sources of load growth. The pace of emissions reductions ultimately depends on how quickly the region can expand clean electricity supply while reliably meeting this growing demand.

State and local role

While federal leadership is needed, particularly to advance transmission expansion and establish emissions limits, state and local actions are projected to reduce energy generation emission by 73 percent by 2050 relative to 2005 levels. Implementing CEJA in Illinois, advocating for clean energy policies in neighboring states, and adopting local renewable procurement programs and clean heat standards will be central to achieving these outcomes. Together, these actions demonstrate the pivotal role that regional and local leaders play in shaping a cleaner, more resilient, and fairer energy future.

Figure 13. Energy demand by fuel for the plan implementation scenario, 2020-2050



Note: Projected electricity demand reflects electrification associated with modeled plan strategies and does not include additional load growth from data centers or other economic changes.

Source: CMAP and E3, 2025.

The following objectives and strategies outline specific actions needed by federal, state, and local governments as well as utility partners to achieve these reductions — highlighting both near-term opportunities and long-term pathways for transformation. Find details on modeled strategies in Appendix D.

Objective 1: Clean the electric grid

Nearly all emissions-producing activities rely on energy — often electricity — and both the amount and source of that energy shape sector-wide emissions. Buildings and industry consume the most electricity, generating the highest emissions when powered by fossil fuels like coal and natural gas. Transitioning to renewable energy sources like wind, solar, and battery storage, along with existing nuclear, is essential. Emerging technologies, including geothermal, long-duration energy storage, and advanced nuclear, may further support this transition. Ensuring electricity is clean is critical to reducing emissions across an increasingly electrified economy.

1.1 Implement Illinois' Climate and Equitable Jobs Act

Illinois' CEJA, passed in 2021, is the state's central climate policy, setting an ambitious pathway for economy-wide decarbonization by 2050. The law requires Illinois electricity generation facilities to eliminate their emissions by 2045, raises the state's renewable portfolio standard to 50 percent by 2040, and sets a goal of 100 percent clean energy, including nuclear, by 2050.

Since 2005, Illinois has reduced emissions by 20 percent, with a 2025 interim target of 26 percent reductions.[56] If CEJA is fully implemented, Illinois' electricity generation emissions would decline by 100 percent by 2050, accounting for nearly 63 percent of the region's reductions projected under the current policy scenario (Table 9).

While the policy framework is established, continued implementation of CEJA requires sustained leadership and coordination across state, utility, and local actors. At the state level, the Illinois Power Agency oversees the procurement of renewable energy credits to meet the act's renewable energy requirements and must advocate for increased funding to prevent budget shortfalls that could hinder progress.[57] The Illinois Commerce Commission, as the state utility regulator, is responsible for ensuring utilities meet CEJA goals through multi-year integrated grid plans and beneficial electrification plans, while also facilitating the retirement or clean-fuel transition of fossil power plants and fully implementing its Renewable Energy Access Plan.[58]

ComEd, which serves most of northern Illinois, plays a central role in decarbonizing the region's grid. The utility must continue to invest in modernizing its distribution infrastructure to accommodate emerging electricity demands from building and vehicle electrification, data centers, and other industrial uses.[59] Illinois municipal and rural cooperative electric utilities must also meet CEJA goals, including municipal electric utilities in Batavia, Geneva, Naperville, St. Charles, and Winnetka. For example, St. Charles recently declined to extend its contract with the Illinois Municipal Electric Agency that would have locked the city into coal-based electricity through 2055, positioning the city to pursue cleaner electricity suppliers — a potential model for other municipalities.[60]

State agencies continue to work with utilities to ensure compliance, and the Illinois Climate Bank's Small Utility Clean Energy Planning Grant provides funding to help municipalities plan their transition to clean energy sources.[61]

Energy efficiency resource standards further advance CEJA's goals, requiring electric and natural gas utilities to achieve long-term customer energy savings that reduce peak demand, lower costs, and cut emissions. This is enforced at the state level by the Illinois Commerce Commission and the Illinois Power Agency. The Illinois Commerce Commission establishes savings targets and reviews and approves utility energy efficiency measures, while the Illinois Power Agency reviews utility energy procurement plans that include those measures and related studies.[62]

Table 9. Implement the Illinois Climate and Equitable Jobs Act

Scenario	Modeled strategy	GHG emissions reduced, MMT CO_2e (% of sector emissions)	
		2035	2050
Current policy	Require the State of Illinois to eliminate emissions from electricity generation facilities by 2045; raise the state renewable portfolio standard to 50% by 2040; and require 100% clean energy by 2050.	5.1 (14%)	22.8 (63%)

Source: CMAP and E3, 2025.

1.2 Advance clean electricity standards in Indiana and Wisconsin

Indiana and Wisconsin lack binding requirements to eliminate all electricity generation emissions. Both states have set voluntary goals for renewable energy, but these targets fall short of the levels needed to meet the greater Chicago region's climate ambitions. Indiana's voluntary clean energy portfolio standard aims for 10 percent of electricity from clean sources by 2025, but allows clean coal and natural gas to count toward that goal, which are not truly carbon free.[64] In addition, recent executive orders in Indiana encourage extending the operational life of coal generating plants. Wisconsin's 2022 Clean Energy Plan sets a goal of 100 percent carbon-free electricity by 2050; however, this remains aspirational without regulatory enforcement.

To achieve the region's emissions reduction goals, both states must adopt stronger, enforceable clean electricity standards that transition their grids to genuinely carbon-free sources (Table 10). Federal regulation of GHG emissions from the power sector remains essential. However, in its absence, state legislative action would need to establish mandatory targets and efficiency standards, similar to Illinois' CEJA, and remove local ordinances that limit renewable energy siting. This is particularly important in Indiana, where community-level opposition often makes projects infeasible.[65]

Electric utilities serving the region, including NIPSCO in Indiana and WE Energies in Wisconsin, must also adopt more ambitious carbon-free targets. While some of these utilities have plans to increase renewable energy generation, none of them currently intend to retire all natural gas facilities or eliminate all fossil fuels.[67] Achieving full decarbonization in any state requires sustained advocacy, policy leadership, and ongoing pressure for legislative reform.

Municipal and rural electric utilities also play a role. In Indiana, Kingsford Heights operates a municipal electric utility, while Lake, La Porte, and Porter counties are served by the Kankakee Valley Rural Electric Membership Corporation. State support and collaboration with these smaller utilities will be essential to ensure that all communities in Greater Chicago benefit from the clean electricity transition.

Table 10. Adopt clean electricity standards in Indiana and Wisconsin

Scenario	Modeled strategy	GHG emissions reduced, MMT CO_2e (% of sector emissions)	
		2035	2050
Plan implementation	Adopt standards that reduce electricity generation emissions until they reach 95% below 2005 levels, approximately achieving a 98% clean electricity standard by 2050.	6.1 (16%)	5.8 (16%)

Note: Emissions reductions under this measure peak in 2038 and then remain constant for the remainder of the plan.

Source: CMAP and E3, 2025.

1.3 Advocate for federal and regional energy market reforms

Decarbonizing the region's electricity system cannot be achieved through local action alone. While expanding renewable generation within the region is essential, many critical electricity supply decisions are made at a larger level through regional transmission organizations (RTOs), such as PJM Interconnection (PJM), representing the Illinois portions of the plan geography, and the Midcontinent Independent System Operator (MISO), representing Indiana and Wisconsin. Both RTOs are regulated by the Federal Energy Regulatory Commission (FERC). Aligning these entities with the region's climate goals is essential to creating a clean, affordable, and reliable energy system.

Local governments, states, and advocacy organizations should collectively advance clean energy strategies within PJM and MISO. Key strategies include:

- Advocating for market rules that prioritize renewable generation.
- Streamlining interconnection queues, particularly for renewables and distributed energy resources.
- Ensuring transmission planning supports the region's clean energy goals.

Active participation in RTO stakeholder processes and regional state committees is critical to elevating local voices. Within the region, Illinois' local governments and advocacy organizations should engage with PJM, while those in Indiana and Wisconsin should engage with MISO. States can further strengthen accountability and representation by passing legislation that increases transparency and fairness in RTO governance, ensuring that renewable energy companies and public interest groups have a voice.

At the federal and state levels, policies should support a responsible transition away from fossil fuels. Measures can include stricter carbon pollution standards for existing plants, efficiency upgrades, and limiting carbon capture to transitional uses. Market-based tools, such as cap-and-invest programs, can accelerate the retirement of high-emitting facilities while ensuring fair transitions for affected workers and communities. Illinois should continue taking the lead within the region by implementing CEJA, leveraging and creating new CEJA-aligned policies, and encouraging Midwest states, including Indiana and Wisconsin, to collaborate on regional initiatives.

Finally, FERC must hold PJM and MISO accountable for transmission planning and siting that enables clean energy deployment. States can also use the state agreement approach to jointly plan and finance transmission infrastructure with RTOs.[68]

Source: City of Chicago.

City of Chicago powers city-owned facilities with renewable energy

In January 2025, all of the City of Chicago's municipal buildings and operations — including O'Hare and Midway international airports — began operating on 100 percent renewable electricity.[71] The transition eliminates approximately 240,000 metric tons of CO_2 emissions annually, equivalent to removing more than 62,000 passenger vehicles from the road each year.

Under a five-year power purchase agreement with Constellation Energy, the city sources 70 percent of its electricity directly from Switch Current Energy's Double Black Diamond Solar farm in Sangamon and Morgan counties. In addition to reducing emissions, the agreement helps ensure sufficient renewable supply to meet the city's demand, stabilizes utility costs, and may generate long-term savings. It also demonstrates how municipalities can drive large-scale solar development and advance the region's clean energy goals; Cook County and Loyola University Chicago have also agreed to purchase power from the solar farm.

Who shapes the region's energy future?

Policy and regulation are among the strongest levers for change in the energy sector. In Greater Chicago, grid operators, state utility commissions, and local governments all influence where and how clean energy resources are deployed.

Federal: The USEPA has historically regulated power plant emissions under the Clean Air Act, while FERC governs interstate electric and gas transmission planning and cost allocation. The U.S. Department of Transportation's Office of Pipeline Safety oversees interstate natural gas pipelines.

Regional grid operators: PJM (northern Illinois) and MISO (serving the Indiana and Wisconsin portions of the region) manage electricity markets, balance supply and demand, and plan transmission under FERC oversight. Their interconnection and transmission decisions largely determine how quickly new clean energy sources come online.

State-level oversight: The Illinois Commerce Commission, Indiana Utility Regulatory Commission, and Wisconsin Public Service Commission regulate utilities, set rates, and implement clean energy policy, with varying ambition. Indiana and Wisconsin maintain regulated markets where utilities own generation and manage both supply and distribution. Illinois operates a partially deregulated market, allowing customers to choose an alternative supplier while delivery remains through regulated utilities.[69]

Utilities: Utility investment in generation, grid upgrades, and customer programs will determine whether state clean energy goals lead to real emissions reductions.

- ComEd (IL): Focusing on grid modernization and inclusive clean energy programs.
- NIPSCO (IN): Retiring coal by 2028, but keeping natural gas.
- Indiana Michigan Power (IN): Generated more than 87 percent of its power from clean and nuclear energy; plans to quadruple clean resources by 2028 but still reliant on gas.
- WE Energies and Alliant (WI): Net-zero pledges by 2050 but continued gas dependence.
- Natural gas utilities: None have phase-out plans. Illinois' Future of Gas process is exploring long-term options, including a potential transition to networked geothermal.
- Municipal utilities: Some municipal utilities are advancing renewable adoption, though not all have committed to a full transition away from fossil fuels. The Illinois Municipal Electricity Agency, for instance, has adopted a sustainability plan, but continues to pursue long-term agreements that would extend reliance on coal-fired power.

Consumer advocacy groups: Independent nonprofit organizations ensure residential and business ratepayers have a voice in grid operator and utility decisions. In Greater Chicago, the Citizens Utility Board (CUB) in Illinois, CUB of Wisconsin, and the Citizens Action Coalition in Indiana advocate for electric customers, promoting consumer protections and affordability through advocacy, research, education, outreach, and policy engagement.

Local governments: Counties and municipalities influence renewable energy deployment through zoning and permitting, either accelerating or restricting them.

1.4 Support local renewable energy development

Local governments also have a strong and direct role in supporting the development of renewable energy. County and municipal governments can adopt siting and zoning ordinances that streamline rooftop and community solar, wind, battery storage, and geothermal projects; make public land available for clean energy development; and provide financial incentives for homes and businesses to invest in renewable projects. In Illinois, these efforts are now reinforced by the Clean and Reliable Grid Affordability Act, which prohibits county-level bans and moratoriums on commercial wind and solar projects and limits additional restrictions beyond those established in state law. The legislation also establishes consistent siting and permitting procedures to provide clarity for developers and local governments alike.[70] As many communities navigate public concerns around large-scale energy projects, local governments can help build trust by addressing misconceptions, coordinating with local partners such as fire districts and neighboring municipalities, and ensuring that developments deliver visible community benefits.

Municipalities can also purchase renewable energy to power local grids and remove restrictive ordinances that block renewable energy projects. For nearly a decade, programs like SolSmart and the Community Solar Clearinghouse Program have helped municipalities in northeastern Illinois reduce barriers to solar, become solar ready, and connect to community solar projects. When combined with state policy frameworks like CEJA and utility-led initiatives, these local actions are essential for translating policy into tangible emissions reductions, delivering cleaner energy for residents, and achieving a resilient, fair clean energy transition across the greater Chicago region.

Objective 2: Modernize and expand grid capacity

The plan's decarbonization strategies will increase electricity demand. The region needs a more efficient grid capable of moving more power over longer distances and integrating renewable and distributed resources at scale. Upgrading the transmission and distribution systems will enable more dynamic electricity management, improve grid reliability and flexibility, and reduce overall generation needs. Expanding capacity and deploying grid-enhancing technologies will support a cleaner, more resilient system.

2.1 Implement grid-enhancing technologies

To modernize the electric grid, utilities and transmission providers should adopt grid-enhancing technologies. These technologies, such as dynamic line ratings, advanced power flow control, and topology optimization, increase the capacity and flexibility of existing transmission lines, allowing electricity to flow more efficiently.[72] By reducing congestion and enabling greater integration of renewable energy, grid-enhancing technologies can defer the need for costly new transmission infrastructure — saving money for utility customers while accelerating decarbonization.

State governments can play a critical role in promoting grid-enhancing technology adoption. Indiana has already passed legislation requiring utilities to integrate them into transmission planning.[73] Illinois is considering similar requirements through the Clean and Reliable Grid Act, which would mandate public utilities to incorporate cost-effective grid-enhancing technologies in new projects.[74] The Illinois Commerce Commission has also encouraged utilities and RTOs to include them in future planning through its Renewable Energy Access Plan.[75] Wisconsin should pursue comparable policies to accelerate grid-enhancing technology deployment.

2.2 Improve transmission planning and siting

Forward-looking regional transmission planning is essential for a reliable, affordable, and clean electricity grid as demand grows and renewable energy integration expands. While short-term tools like grid-enhancing technologies can increase capacity on existing lines, new transmission and distribution infrastructure will still be needed to meet the region's long-term needs. To meet rising electricity demand, much of the region will rely on imported renewable energy from elsewhere in Illinois or from other Midwest states, often requiring multi-state transmission lines that are costly, slow to build, and politically complex. Within the region, aging infrastructure and local ordinances — particularly in parts of Indiana — further complicate the clean energy transition.

Securing land rights across multiple jurisdictions is a common challenge in transmission development, often leading to delays, legal disputes, or project cancellations. Utilities should coordinate with transportation agencies to maximize the use of existing rights-of-way, such as highways and rail corridors, to streamline permitting, minimize land-use impacts, and reduce costs. When new corridors are unavoidable, siting should prioritize minimizing impacts on natural lands and include measures to mitigate unavoidable effects. Strategic site preparation — particularly for areas with high potential for economic growth or industrial redevelopment — can help align transmission planning with economic development objectives, ensuring that clean, reliable power is available where it can support new investment and job creation. Aligning local policies with regional clean energy goals is also critical to prevent restrictions that block renewable energy projects.

Because transmission spans multiple states and voltage levels, it is crucial for PJM, MISO, and state utility commissions to coordinate. Multi-state planning efforts, such as expanded transmission studies, can forecast demand, identify system gaps, and guide aligned investment across Illinois, Indiana, and Wisconsin.[76]

States should also integrate transmission planning with broader grid modernization efforts, including market reforms that prevent uneconomic fossil fuel plants from committing to continued, unneeded, and costly operations and upgrades. They should also transition from cost-of-service regulation, which can misalign utility incentives with consumer needs, to performance-based models that reward clean, reliable, and cost-effective investments.[77] Together, these strategies can reduce transmission bottlenecks, support renewable energy deployment, and ensure the region's clean energy transition benefits all communities.

2.3 Increase distributed energy resource integration

Households and businesses adopting rooftop solar, battery storage, and electric vehicles create distributed energy resources (DERs) — small-scale, customer-side energy systems that diversify supply, reduce strain on centralized power plants, and improve grid resilience. While they add complexity, proactive planning allows utilities to anticipate deployment, manage demand, and respond to local needs, strengthening reliability.

Fully leveraging DERs requires modernized grid infrastructure, streamlined interconnection processes, and real-time coordination through DER management systems.[78] Utilities, regulators, and DER providers must collaborate to implement flexible interconnection options, market participation models for aggregation, and develop incentives or financing programs to support adoption. Equally important is establishing fair

valuation and compensation mechanisms that reflect the true benefits DERs provide — such as avoided generation costs, grid support, and local reliability. This can include time-of-use rates, value-of-solar tariffs, or performance-based credits that reward systems based on when and where they provide value.

The Illinois CEJA requires utilities to plan for DER integration and establish mechanisms to fairly value and compensate distributed generation, including programs that make adoption affordable for low-income households.[79] ComEd's net metering and solar credits and the Illinois Solar for All program enable customers to sell excess energy back to the grid and expand equitable access to renewable energy.[80] The 2025 Clean and Reliable Grid Affordability Act builds on CEJA by directing utilities to expand distributed resource planning, pilot virtual power plants, and implement time-of-use rate programs to improve flexibility and reliability while accelerating DER adoption across the state.[81]

Indiana has guidelines requiring utilities to provide DER interconnection and fair compensation through net metering, with renewable generation currently capped at 1 megawatt.[82] NIPSCO's Excess Distributed Generation tariff offers customers bill credits worth 125 percent of market power prices for excess energy and waives application fees for systems under 10 kW — an approach that supports smaller, more affordable projects.[83] The Power Up Wisconsin initiative promotes local energy generation and grid modernization, providing a framework for expanding clean energy access and resilience across the state.[84]

2.4 Plan for emerging energy demands

As the region transitions to a cleaner grid, new electricity demands — like data centers and other energy-intensive developments — are expected to emerge alongside growth from electrification. If not carefully planned, these concentrated loads could increase reliance on fossil fuel generation and threaten both climate goals and electricity affordability, particularly for energy-burdened households. Because future industrial and commercial projects will continue to require significant and reliable energy, early site readiness — such as ensuring available capacity and pre-planning for clean energy connections — can help attract investment while avoiding costly, reactive upgrades later. Preparing sites in advance also helps ensure that the burden of new infrastructure does not fall solely on prospective businesses, supporting both economic growth and long-term grid resilience.

In Illinois, the Clean and Reliable Grid Act strengthens the state's authority to plan for these emerging loads. The law directs the Illinois Commerce Commission to require integrated resource planning, evaluate the impact of large new electricity users (including data centers), and ensure utility investments support reliability, decarbonization, and affordability. This new planning framework enables the state to assess future load growth proactively rather than reacting project-by-project.

State governments and utilities should set principles to manage new demand in ways that support decarbonization and fair costs. Strategies include siting and designing facilities for energy and water efficiency, incorporating on-site or contracted renewable energy, contributing to grid flexibility through storage or demand management, and ensuring new demand sources bear their fair share of electricity system costs. Utilities and governments can require large new loads to submit plans showing how they will limit emissions and minimize stress on the grid. Proactive planning ensures emerging demands support economic growth while advancing the region's clean energy transition.

How will data centers impact energy demand?

Data centers are poised to significantly increase energy demand in the greater Chicago region.

New analysis from the University of Virginia's Weldon Cooper Center reveals that the Chicago metropolitan statistical area has 114 operational data centers and 60 planned as of 2025.[86] They project that Illinois could see data centers account for as much as 30 percent of total electricity demand by 2040 and 40 percent by 2050. Neighboring Indiana and Wisconsin are also expected to experience sharp increases, with data centers representing roughly 20 to 25 percent of state demand by mid-century.

These facilities — particularly hyperscale and wholesale centers — require tens of megawatts of continuous power, rivaling the electricity use of entire towns. At the same time, data centers contribute to regional economic vitality, generating jobs, tax revenue, and infrastructure investment that can help strengthen local economies.

While average energy efficiency has improved over time through better cooling technologies and design standards, those gains are being outpaced by rapid growth in floor area and computing intensity, especially as artificial intelligence workloads increase.

As debate intensifies over how to manage this growth, policymakers and regulators are weighing whether data centers should be required to provide their own on-site renewable generation and storage or to participate in demand-response and curtailment programs during peak periods. These measures could help reduce grid stress and maintain reliability, but may also affect where companies choose to locate their facilities.

At the same time, Illinois, Indiana, and Wisconsin each offer tax exemptions and credits to attract data centers, programs that will likely accelerate development and the region's associated energy demand. Balancing these economic incentives with the need for sustainable energy planning will be essential to ensure that data center growth strengthens rather than undermines the region's clean energy transition.

Objective 3: Plan for the future of the natural gas industry

Natural gas is deeply embedded in the region's energy system, supplying most homes and businesses with heat, hot water, and cooking fuel, as well as supporting select industrial processes. In Greater Chicago, natural gas accounts for nearly 27 percent of total GHG emissions. Meeting long-term climate goals requires a deliberate, managed transition away from fossil gas toward cleaner alternatives.

Unlike electricity, which has clearer pathways to decarbonization, the future of natural gas remains largely uncharted. No U.S. region has yet overseen a full-scale phaseout of gas distribution infrastructure. Illinois' ongoing Future of Gas regulatory proceeding, expected to conclude in early 2026, offers an early model of the kind of governance reform needed. The process is non-binding but is intended to generate recommendations for how utilities should plan for declining demand, prevent overinvestment in long-lived fossil infrastructure, and explore new business models such as networked geothermal.[87] Further regulatory and legislative action will be needed to translate these recommendations into reforms. Similar efforts will be necessary across all three states to align gas system planning with climate goals.

This work should be guided by the following principles:

- **Reliability and safety:** Ensure homes and businesses can depend on stable energy service during the transition.
- **Affordability:** Protect low- and moderate-income households from rising rates as system costs are spread across a shrinking customer base.
- **Fairness and health:** Prioritize electrification and clean alternatives in communities most affected by air pollution and burdened by energy costs.
- **Transparency and accountability:** Require utilities to file long-term gas transition plans and subject those plans to public oversight.

These principles provide a framework for managing the natural gas transition. Translating them into action requires policy, regulatory, and investment strategies that guide utilities and consumers through the shift.

The following strategies outline initial steps states and utilities can take to reduce emissions, modernize infrastructure, and prepare for a future built on clean, affordable energy.

3.1 Adopt clean heat standards

As the region transitions to a clean energy future, states will need strategies to reduce dependence on fossil natural gas while maintaining affordability and reliability for homes and businesses. Clean heat standards require gas utilities to deliver an increasing share of low-emission services to customers, thereby easing the transition from natural gas to electricity.

Utilities can meet these targets through energy efficiency improvements, building electrification (such as heat pumps), renewable fuels, or by purchasing verified emission reduction credits. Implemented in states such as Colorado and Vermont, and under development in nearly a dozen other states, clean heat standards shift responsibility for reducing emissions from individual customers to gas utilities, providing a structured and flexible approach to decarbonizing the heating system.

Although clean heat standards are a relatively new policy tool, the region can look to states like Colorado and Vermont — as well as other resources — to design an effective standard. The Energy Futures Group prepared a report for the Environmental Defense Fund comparing standards across the country and outlining key elements to consider when designing a clean heat standard.[88] According to the report, an effective clean heat standard should apply to a gas utility's entire customer base — including residential, commercial, and industrial sectors — and encompass all conventional fossil fuel types. It should also clearly define what qualifies as acceptable clean heat and establish a transparent system for purchasing and tracking credits. For example, Colorado's standard allows gas utilities to use biomethane (a type of renewable natural gas) to achieve the 2030 reduction target but caps its use at 5 percent. This ensures that utilities cannot rely on the strategy alone to achieve compliance.

In addition, the implementation of clean heat standards should align with regional grid capacity and planning efforts and should be designed with affordability and cost in mind, ensuring that low- and moderate-income customers are not left behind. Utilities pursuing electrification or energy efficiency strategies, such as weatherization or heat pump incentives, should also coordinate with other programs and administrators offering similar services to streamline efforts and maximize customer benefits.

If Illinois, Indiana, and Wisconsin each adopted a performance standard requiring gas utilities to reduce emissions by 22 percent by 2035, natural gas emissions could drop by as much as 28 percent by 2050 (Table 11).

Table 11. Adopt clean heat standards

Scenario	Modeled strategy	GHG emissions reduced, MMT CO_2e (% of sector emissions)	
		2035	2050
State and local	Adopt clean heat standards that require natural gas utilities to reduce natural gas emissions by 22% by 2035.	5.5 (10%)	12.0 (28%)

Source: CMAP and E3, 2025.

3.2 Leverage renewable natural gas as a transitional tool

In sectors where electrification is more challenging, renewable natural gas (RNG) — produced from waste and residue feedstocks that would otherwise generate emissions in other sectors if not used — can serve as a lower-emitting, cost-effective transitional fuel. States can promote RNG through their own financial incentives, procurement targets, and partnerships with utilities and private developers, while federal action can further advance those efforts.

In this plan, RNG supply is constrained to a capped amount using only the waste and residue feedstocks — excluding dedicated energy crops — that are produced within the region. Capturing methane from landfills, wastewater treatment plants, and agricultural waste for RNG production not only replaces fossil natural gas use but also directly reduces emissions from those waste sources.

As a transitional strategy, requiring gas utilities to replace a portion of fossil natural gas with RNG can help reduce emissions while preparing infrastructure and markets for a full transition to clean heat and electrification. However, overreliance on RNG could slow progress toward long-term decarbonization if it delays investments in electrification or locks in gas infrastructure.

Therefore, careful policy design will be needed to ensure RNG serves as a bridge — not a substitute — for fully clean energy systems. If the use of RNG made from waste and residual feedstocks from the region's waste, wastewater and agricultural sectors was capped annually at 45 TBtus in industrial facilities, the region could reduce industrial emissions by 5 percent (Table 12).

Table 12. Limit the use of renewable natural gas blending

Scenario	Modeled strategy	GHG emissions reduced from current policy scenario, MMT CO_2e (%)	
		2035	2050
Plan implementation	Limit the region's use of RNG from waste feedstocks in industrial facilities to 45 TBtus by 2050.	0.6 (1%)	2.4 (5%)

Source: CMAP and E3, 2025.

Fox Metro advances renewable natural gas in the region

The Fox Metro Water Reclamation District in Aurora, Illinois, is transforming its biogas recovery process. In 2023, Fox Metro began construction on an RNG project, set to be completed in the fall of 2026. With new technology, Fox Metro will filter captured biogas into RNG and transfer it to the Nicor pipeline. This RNG will then be sold to Nicor customers.

Currently, Fox Metro flares nearly 60 percent of the biogas it captures and uses the other 40 percent on-site. The new RNG technology will replace flaring, significantly reducing GHGs and other air pollutants released during the flaring process.[89] The project will also include a decant station, which will allow neighboring wastewater treatment plants to bring biogas to the facility for treatment and transfer to the Nicor pipeline — paving the way for Fox Metro to become a regional RNG hub.[90]

3.3 Encourage natural gas utilities to transition to geothermal energy utilities

As states move toward full building electrification, natural gas utilities face increasing pressure to redefine their role in a decarbonized energy system. One promising pathway is the transition into geothermal energy providers, leveraging subject-matter expertise and customer relationships to deliver clean, renewable heating and cooling.

Advances in shallow and networked geothermal systems now make large-scale deployment more cost-effective. By investing in shared geothermal networks that connect multiple buildings, utilities can provide reliable, low-emission thermal energy while avoiding gradual obsolescence of their gas distribution systems. State governments can help this transition by funding pilot projects, providing technical assistance, and convening stakeholders to explore regulatory and business model reforms. Illinois' Future of Gas proceedings offer a model for this type of planning, engaging utilities, regulators, and consumers in shaping the sector's transition. Indiana and Wisconsin should establish similar processes to chart their own pathways toward a clean, geothermal-based utility future. Geothermal networks, and the role local governments can play, are also discussed in the residential and commercial buildings chapter.

3.4 Invest in repairing broken and leaking gas pipelines and infrastructure

As natural gas systems age and investments decline, the risks of leaks, fires, and explosions increase — along with the release of methane, a potent greenhouse gas. These hazards are particularly acute in low-income neighborhoods, where older infrastructure and limited resources heighten vulnerability to both safety risks and rising energy costs.

State and local governments should partner with utilities to repair and replace deteriorating pipelines, prioritizing projects that address public safety and reduce methane emissions. Legislation can also require timely leak detection, reporting, and repair, as is being explored in Illinois' Future of Gas proceedings — an approach that Indiana and Wisconsin could replicate. While this work may extend the lifespan of natural gas systems, prioritizing safety alongside emissions reductions will be essential during the transition to cleaner, more sustainable energy sources. Longer-term priorities involve setting a clear phase-down schedule for natural gas.

Energy affordability

Communities across the region already experience burdens from today's energy system — and could face new or worsening challenges during the clean energy transition if their needs are not explicitly addressed.

Many residents struggle with high and volatile energy costs, and for low-income and older households, even cooling and heating can be unaffordable. Much of the electricity consumed in the region is generated elsewhere, and the cost of importing and transmitting that power contributes to rising utility bills.

Communities located near fossil fuel facilities face additional harm. Coal- and gas-fired power plants emit an array of pollutants linked to asthma, heart and lung disease, and premature death.[91] Extracting, transporting, and disposing of fossil fuel waste further contaminates air, soil, and water, threatening nearby neighborhoods and agricultural productivity.[92] These environmental burdens accumulate over time, leaving residents to face damage that can span generations.

As the region electrifies transportation, buildings, and industry, overall electricity demand will grow — particularly during daytime peak hours when rates are highest. Without careful planning, these shifts could make energy less affordable for households already facing high energy costs.

The transition away from natural gas will also pose challenges: gas prices remain lower than electricity, and the extensive gas pipeline system will still need to be maintained for safety and reliability even as customers leave.

Communities that have relied on fossil fuel facilities for employment may also experience economic disruption as plants and pipelines are retired.

Climate change adds further pressure. More frequent heat waves, cold snaps, and severe storms strain the electric grid and can cause outages that disproportionately affect those least able to adapt. Flooding and extreme weather can also damage energy infrastructure and reduce the performance of some renewable energy technologies. Together, these factors underscore the need for a resilient and affordable clean energy system that prioritizes the health, safety, and economic stability of all residents.

Ensuring that the transition to clean energy is both fair and reliable requires targeted investments in grid modernization, support for vulnerable households, and workforce programs that create new opportunities where jobs are lost.

05

Industry

About this chapter

This chapter outlines industry's role in achieving the region's reduction targets, including current conditions, modeled scenarios, and key objectives and strategies. It shows how coordinated action across state, local, federal, and private partners can deliver a 77 percent reduction in industry emissions by 2050, with select measures quantified to show the scale and pace of change required. Although the reduction target does not rely on carbon capture and storage, the chapter assesses its potential role and key safety considerations as the technology continues to evolve.

Industry objectives and strategies

1. Adopt energy efficiency improvements within industrial facilities

1.1. Establish facility emissions limits for manufacturing facilities

1.2. Strengthen energy efficiency technical assistance

1.3. Increase financial support for efficiency improvements

2. Electrify industrial processes and adopt cleaner fuels and feedstocks

2.1. Electrify iron and steel production by 2050

2.2. Establish Buy Clean programs for cement and steel

2.3. Support electrification of natural gas use for process and facility heating

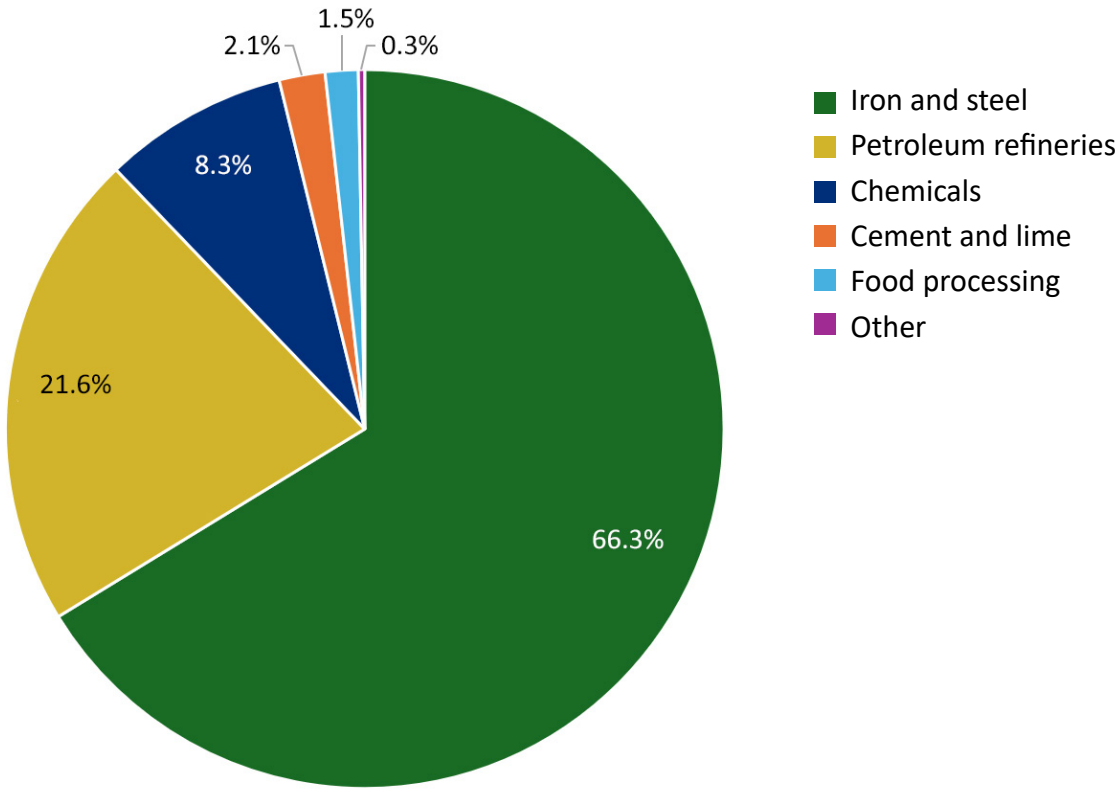
2.4. Provide strategic financing and coordination

Decarbonizing the region's industrial sector is essential to achieve climate goals and maintain long-term economic competitiveness. Making deep reductions requires improving energy efficiency, electrifying process heat, deploying low-carbon fuels, and modernizing production methods across key industries. These actions will not only reduce GHG emissions but also improve air quality, safeguard communities, and strengthen the region's position in a global clean energy economy.

Industry is central to the region's economy — and its emissions

Industry accounts for nearly 37 percent of the region's total emissions (56 MMT CO_2e), reflecting the region's concentration of energy-intensive manufacturing and processing. Major subsectors include steelmaking, petroleum refining, chemical manufacturing, and cement and lime production — industries that are critical to both the regional economy and national supply chains (Figure 14). Indiana alone produces roughly 27 percent of all U.S.-made steel, most of it within the plan boundary, supporting electric vehicle and clean energy technology manufacturing that underpins national decarbonization efforts.

Figure 14. Industrial facility emissions by subsector, 2020

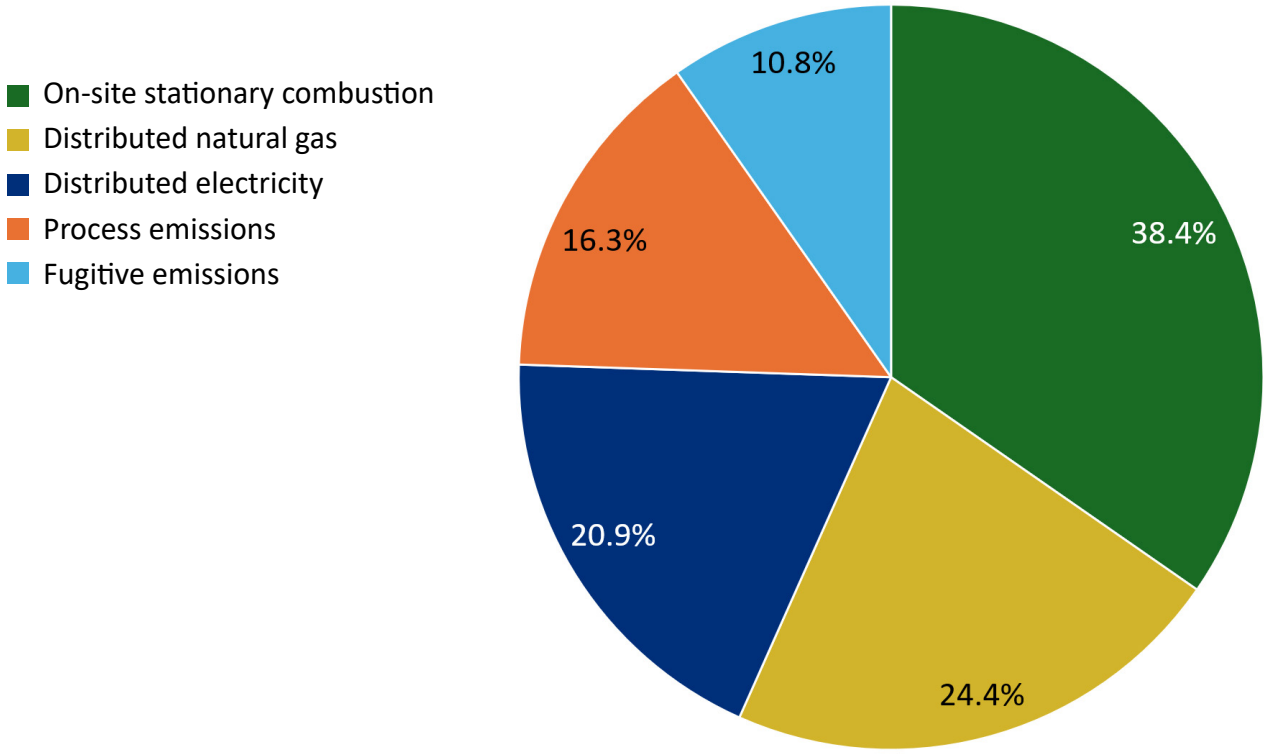


Note: This figure shows the sector breakdown of direct industrial emissions, including fugitive emissions, industrial process emissions, and emissions from on-site stationary combustion. It excludes industrial emissions from purchased electricity or natural gas used by industrial facilities, as those cannot be attributed to specific facilities or subsectors.

Source: CMAP 2020 GHG Inventory, 2024.

Industrial emissions stem from the electricity and natural gas supplied by utilities, on-site stationary combustion of other fuels, and industrial process emissions (Figure 15). Between 2005 and 2020, regional industrial emissions fell 14 percent (9.2 MMT CO_2e), driven largely by reductions in process emissions and cleaner electricity. Illinois' increasingly low-carbon grid has played a significant role in these declines, consistent with national trends — industrial emissions nationwide have dropped 22 percent since 1990.

Figure 15. Industrial greenhouse gas emissions by source, 2020



Note: On-site stationary combustion is the burning of fuel at a facility to produce energy for industrial processes, heating, steam, or electricity. Distributed natural gas is the use of purchased and delivered natural gas at a facility, and distributed electricity is the use of purchased and delivered electricity at a facility. Process emissions include emissions released directly from chemical or physical processes in industrial activities. Fugitive emissions include unintentional releases of gases, often during handling, transport, or storage of fuels or industrial materials.

Source: Greenhouse Gas Reporting Protocol, 2020.

Industrial emissions are geographically concentrated

Although industrial activity occurs across nearly every county, emissions are concentrated in a small number of high-emitting facilities. Lake County, Indiana, accounts for roughly half of all regional industrial emissions, primarily from iron and steel production and petroleum refining, with additional sources in Porter County in Indiana and Cook and Will counties in Illinois (Figure 16). Trends diverge sharply by state: between 2005 and 2020, Illinois industrial emission fell 46 percent (13.9 MMT CO_2e), largely due to reductions in on-site combustion, while Indiana's emissions increased 16 percent (5.5 MMT CO_2e), reflecting growth in refining and iron and steel production. Plant closures and production shifts within the region may have also contributed to diverging trends between states.

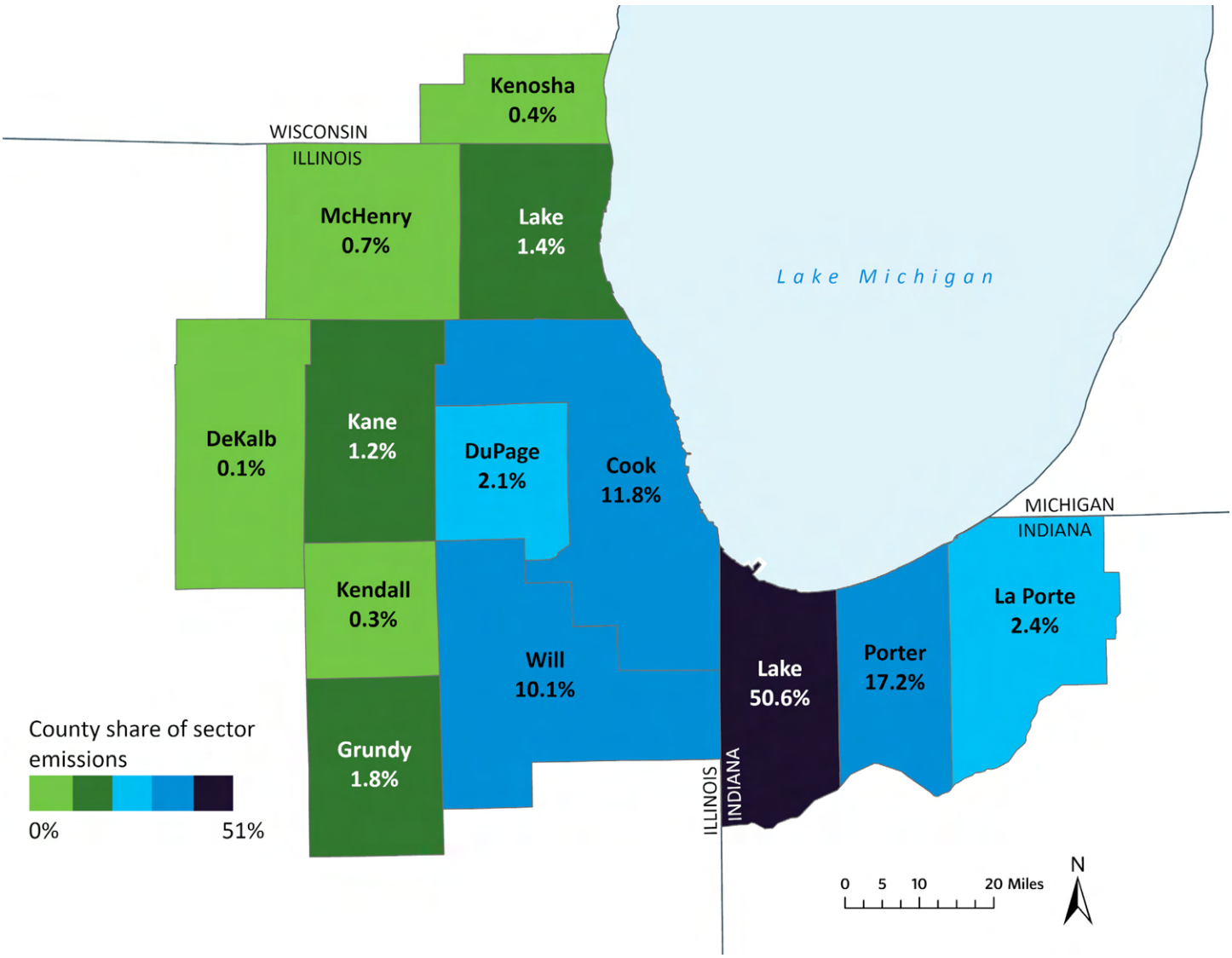
Industrial pollution burdens community health

Communities near industrial facilities face disproportionate health burdens. Heavy industries like steelmaking and petroleum refining emit hazardous air pollutants — such as lead, PM2.5, and nitrogen oxides — which are associated with increased risks of cancer, respiratory illness, and other health conditions. These burdens fall disproportionately on some communities, while workers in heavy industry face heightened exposure on the job. Communities are often forced to reckon with the tension between the economic benefits of industry and these serious health risks. While many decarbonization strategies in this plan have the potential to significantly reduce harmful pollutants, some industrial activities will continue to affect nearby communities.

Industrial decarbonization is difficult but essential

Decarbonizing industry is a challenging proposition. Key strategies, such as shifting away from coal-based steelmaking, electrifying process heating, and developing new production methods require substantial investments in capital equipment, research and development, and workforce training. Electrification of manufacturing processes will also increase demand on the power grid, requiring coordinated energy planning. Moreover, some strategies rely on technologies that are either not yet technically feasible or not commercially mature. Overcoming these challenges will demand collaboration, foresight, and coordinated investment and incentivization across industry, government, and research institutions.

Figure 16. Industrial greenhouse gas emissions by county, 2020



Source: CMAP 2020 GHG Inventory, 2024.

Reaching the 2050 target

The industrial sector must reduce emissions by 77 percent below 2005 levels by 2050 to meet regional climate goals. Reaching this ambitious target requires coordinated and sustained action from both the public and private sectors. With bold investment and collaboration, industrial decarbonization can both protect communities and position the region's economy for long-term competitiveness and innovation.

Current policy scenario

If no new policies are adopted, industrial emissions are expected to fall by 26 percent from 2005 levels by 2050, driven primarily by Illinois' cleaner electricity mix under CEJA. While significant, this reduction falls short of the region's climate target (Figure 17).

Plan implementation scenario

This scenario achieves the 77 percent reduction target, based on two objectives:

1. Adopt energy efficiency improvements within industrial facilities and electrify industrial processes.
2. Adopt cleaner fuels and feedstocks.

Modeled reductions from six of seven industrial strategies drive these outcomes, with particularly large declines in iron and steel emissions alongside reductions across other subsectors (Figure 17).[93] Meeting these and the overall reduction target will depend on continued and enhanced federal support, strong financial incentives, increasing pressure from global and national markets for clean energy solutions, and ongoing technological innovation and deployment.

Carbon capture and storage is optional, not essential

The plan also evaluates the potential role of carbon capture and storage (CCS) — a technology that captures carbon dioxide emissions from industrial sources and stores them underground. CCS is not included in the plan implementation scenario due to concerns around environmental impacts and barriers to effective deployment. Instead, the plan offers considerations for future planning and policymaking and provides modeled estimates of reductions possible through CCS implementation. Modeling indicates that limited adoption could yield an additional 6 percent reduction in industrial emissions by 2050.

State and local role

Actions led by state and local governments would help the region achieve one-third of the reduction needed by 2050 (Figure 18). While federal leadership remains critical, state and local actions — such as Buy Clean policies for iron and steel and facility-level emissions limits — can influence broader markets and demonstrate the region's capacity to make substantial, locally led progress.

Figure 17. Industrial emissions reductions by subsector under the plan implementation scenario, MMT CO_2e (2005-2050)

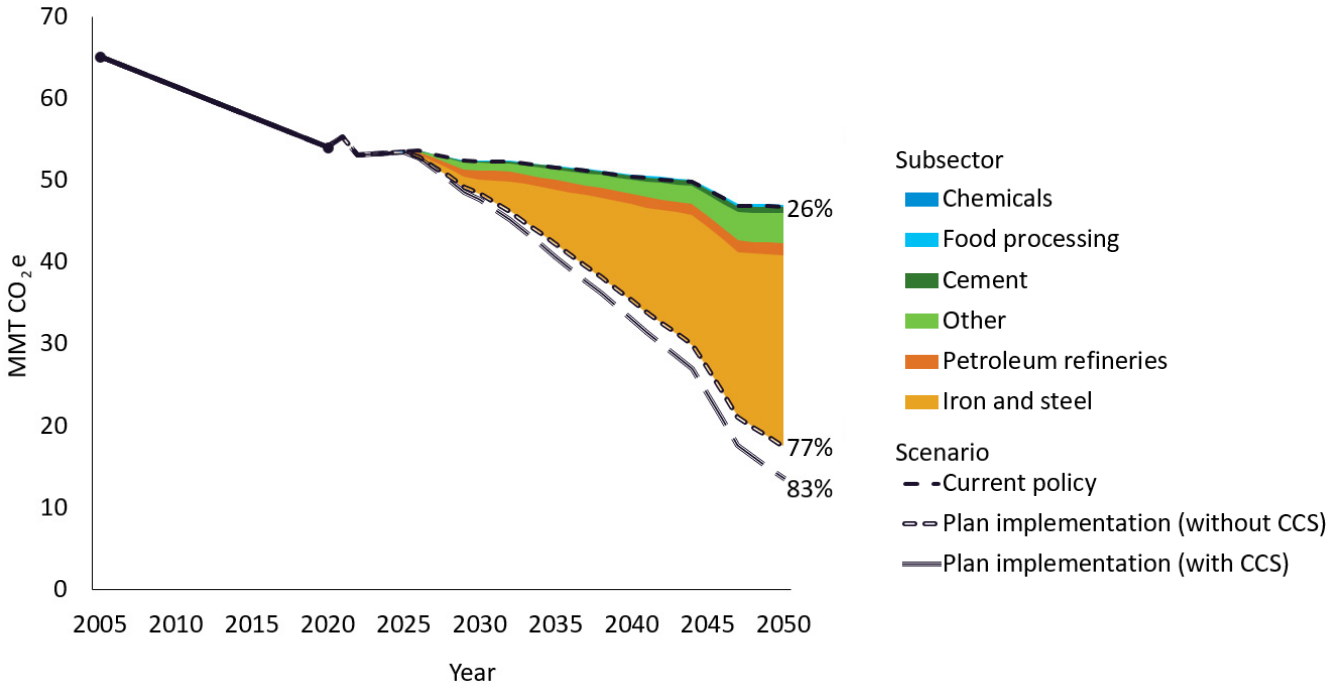
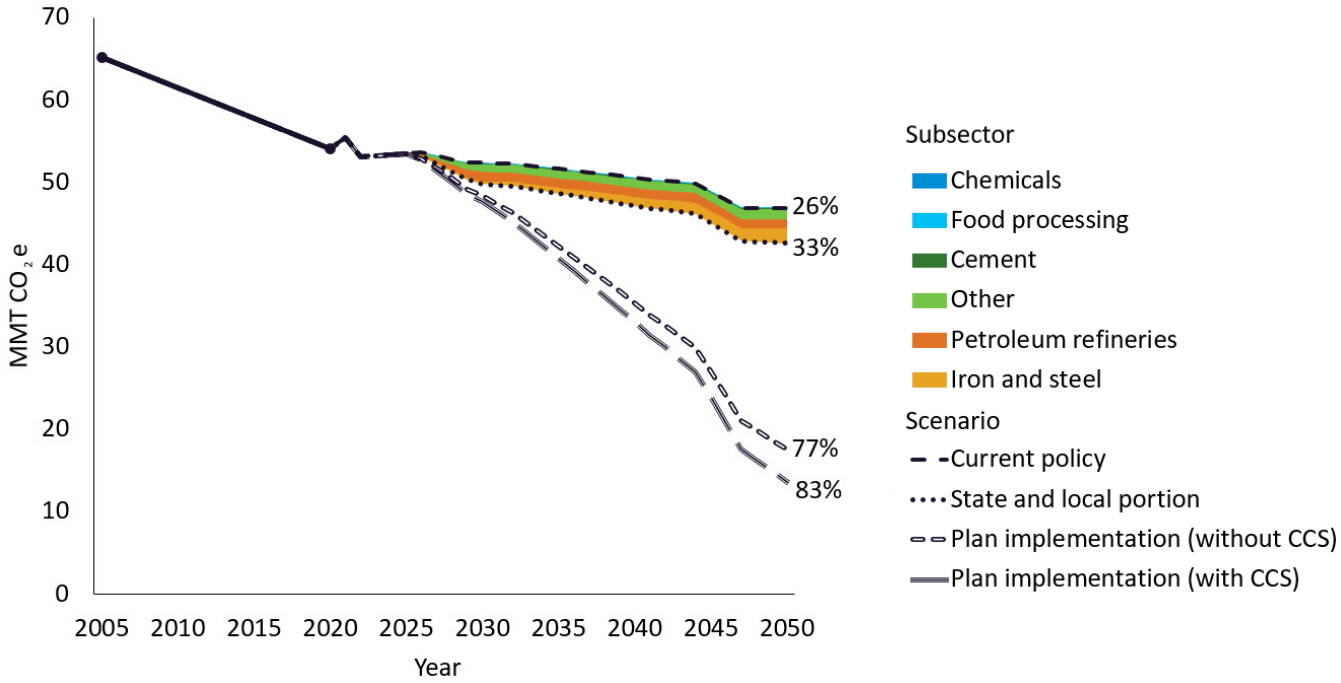


Figure 18. Industrial emissions reductions by subsector for the state and local implementation scenario, MMT CO_2e (2005-2050)



Note (for both figures): Chemicals, food processing, and cement emissions reductions are very small relative to other subsectors and are not visible on the chart. The Other subsector includes industries such as glass production, pulp and paper, and zinc production.

Source (for both figures): CMAP and E3, 2025.

The following objectives and strategies detail specific actions needed by federal, state, and local governments as well as industry partners to achieve these reductions. Find details on modeled strategies in Appendix D.

Objective 1: Adopt energy efficiency improvements within industrial facilities

The region can reduce near-term industrial emissions by decreasing the amount of energy industrial processes consume. This can be accomplished by replacing aging, inefficient systems with high-efficiency alternatives. Strategic energy management practices, which use system-level data to help facility managers identify efficiency opportunities, can also drive efficiency. Energy efficiency improvements not only cut emissions but also complement electrification and clean energy strategies by reducing electricity demand and on-site power generation needs. In turn, these improvements lower operating costs, enhance economic competitiveness, and drive economic growth and employment opportunities. To overcome cost barriers to investments in efficiency, government agencies, industry groups, and technical assistance providers must continue to collaborate to advance a cleaner and more resilient regional industry sector.

1.1 Establish facility emission limits for manufacturing facilities

Setting emission limits for industrial facilities that emit above a certain threshold drives innovation and encourages energy efficiency. Under the Clean Air Act, manufacturers already meet evolving air pollutant standards; applying similar benchmarks for GHGs would require facilities to achieve mid- and long-term reduction targets.[94] Complementary federal actions — such as voluntary efficiency standards, incentive and technical assistance programs, tax credits for early adopters, and research partnerships with energy-intensive industries — can accelerate deployment of advanced technologies and reduce costs. The plan assumes that this combined federal approach could lower regional industrial energy demand by 15 percent (Table 13).

States can also lead by setting their own standards or going beyond federal requirements. Colorado's GHG Emissions and Energy Management for Manufacturing rules, adopted in 2021 and 2023, require 22 high-emitting facilities to cut emissions by 5 to 20 percent by 2030, supported by $168 million in state tax credits. The rules prioritize measures that are technologically feasible, cost effective, and protective of communities by reducing co-pollutants.[95]

Building on this model, the plan assumes implementation of a Colorado-style rule across the region.[96] Energy-intensive, trade-exposed industries like steel and cement would need to reduce emissions by 5 percent by 2030, while other manufacturing facilities reduce emissions by 20 percent (Table 13).[97] While this strategy is feasible, implementation timelines and policy mechanisms will vary by state. In Indiana, a recent executive order limiting new environmental regulations beyond federal requirements could delay adoption of state-level industrial standards. Continued collaboration among regional partners will be essential to advance voluntary, market-based, or federally aligned strategies that maintain progress toward industrial decarbonization goals. Another option is market-based cap-and-invest programs, such as those in California, Washington, and a coalition of northeastern states.[98] These programs set declining emissions limits, require emitters to obtain allowances, and reinvest proceeds into decarbonization and programs like utility bill credits and funding for residential efficiency improvements. The success of both emissions standards and market-based approaches depend on long-term planning and robust financial and technical support to help industrial transition.

Table 13. Increase manufacturing energy efficiency

Scenario	Modeled strategy	GHG emissions reduced from current policy scenario, MMT CO_2e (%)	
		2035	2050
State and local	Establish state facility-level emissions standards for manufacturing facilities, requiring energy-intensive, "trade-exposed" industries (e.g., cement, iron, steel) to reduce emissions by 5% by 2030 and other manufacturing facilities reduce emissions by 20% by 2030.	3.3 (6%)	3.5 (7%)
Plan implementation	Invest in manufacturing energy efficiency standards, supported by technical assistance, R&D, risk sharing, and incentives, to cut manufacturing energy demand by 15% by 2050.	4.3 (8%)	4.3 (9%)

Source: CMAP and E3, 2025.

1.2 Strengthen energy efficiency technical assistance

Federal and state governments and utilities should invest strategically in technical assistance providers to help facilities fully realize efficiency benefits. The industry sector already relies on an ecosystem of utility-led programs, assessment centers, and manufacturing extension services that deliver energy audits, identify savings opportunities, support workforce development, and in some cases promote electrification. The Illinois Sustainable Technology Center, for example, provides on-site assessments, technical guidance, and research to help manufacturers reduce waste, improve efficiency, and adopt cleaner production methods. Cook County's Businesses Reducing Impact on the Environment program provides assessments and grant funding to help small facilities implement upgrades.[99]

To expand their impact, programs must help companies adopt deeper, long-term improvements beyond "low-hanging fruit." Intermediary groups and utilities can also organize sector-specific cohorts, such as food and beverage processing, to foster peer-learning, connect firms with resources, and develop in-house energy efficiency champions.

1.3 Increase financial support for efficiency improvements

For any of these strategies to succeed, federal, state, and local governments, and utilities should expand funding to encourage and accelerate efficiency improvements. While many companies have pursued efficiency for decades, deeper system-level upgrades, such as efficient process heating, require significant capital investment and financial support to implement. The Inflation Reduction Act created much-needed large-scale

investment in industrial efficiency through the U.S. Department of Energy's Industrial Demonstrations Program and Loan Program Office. These and similar efforts must be either reinstated or initiated to meet the region's reduction targets.

Utilities like ComEd and NIPSCO already incentivize the electrification of equipment like forklifts, chillers, and boilers, and building sector efficiency programs should be broadened to include industrial facilities where possible. Importantly, government incentives should not encourage fossil fuel dependence, such as funding new natural gas boilers with long lifecycles.

Source: PVS Chemicals, Inc.

PVS Chemicals captures waste heat to power Chicago manufacturing facility

PVS Chemicals, Inc. is significantly improving energy efficiency at its Chicago sulfuric acid plant by capturing waste steam from its production process to generate on-site electricity.[101] Through a $14.2 million waste heat-to-power project developed with Energy Systems Group, the facility now uses previously unused steam to generate 2.2 megawatts of electricity — enough to supply approximately 95 percent of the plant's electricity needs. By converting excess process heat into power, the project reduces reliance on grid electricity, cuts more than 12,700 metric tons of carbon dioxide emissions annually, and lowers water and chemical consumption through closed-loop condensate recovery. The project demonstrates how industrial energy efficiency and waste heat recovery can deliver meaningful emissions reductions while strengthening the reliability and competitiveness of urban manufacturing.

Objective 2: Electrify industrial processes and adopt cleaner fuels and feedstocks

Beyond efficiency, decarbonizing industry requires a shift from fossil fuels to electrification and low-to-zero-carbon fuels and feedstocks, such as green hydrogen and geothermal energy. Some subsectors also depend on emissions-intensive feedstocks for upstream products, such as natural gas for ammonia production and coal for steelmaking. Because energy intensity, fuel sources, and process complexity vary by subsector, implementation strategies must be narrowly tailored.

2.1 Electrify iron and steel production by 2050

Iron and steel production is the region's largest industrial emitter, responsible for 46 percent of sector GHG emissions as well as harmful co-pollutants that burden surrounding communities.[102] At the same time, steel is critical to the clean energy transition, supplying materials for EVs, renewable energy infrastructure, and building decarbonization. Meeting the region's climate goals is impossible without transforming this sector.

Most emissions come from two northwest Indiana plants: U.S. Steel Gary Works and Cleveland-Cliffs Burns Harbor. Both companies have pledged net-zero by 2050, but their blast furnaces, which rely heavily on coal, are nearing the end of their operational life.[103] Operators and industry leaders must decide whether to reline aging furnaces — locking in decades of future emissions — or invest in direct reduced iron (DRI) technology in combination with electric arc furnaces (EAF).[104] Already producing 70 percent of U.S. steel, DRI-EAF facilities run primarily on electricity and can transition from natural gas to green hydrogen (H2-DRI-EAF), eliminating nearly all emissions.

The plan assumes regional companies will act on their net-zero commitments by transitioning to H2-DRI-EAF, supported by public and private partners (Table 14). Federal action can provide financial resources and regulatory certainty, while states can create plans for steel decarbonization and provide regulatory support and strategic investment. Recently cancelled investments like the Industrial Demonstrations Program, which had designated $500 million for H2-DRI-EAF steelmaking at a Cleveland-Cliffs facility in Ohio, and the Hydrogen Hubs Program should be reinstated and expanded.

Transitioning to clean steel production offers wide-ranging benefits. By reducing co-pollutants, electrified and low-carbon processes can significantly improve air quality and health outcomes for workers and surrounding communities. Shifting away from fossil fuels will also make facilities more resilient to energy price volatility, while investments in DRI-EAF steelmaking can generate new jobs and stimulate economic growth.[105] At the same time, rising national and global demand for low-emissions "green steel" positions the region's industry for long-term competitiveness.[106]

Table 14. Require net-zero iron and steel production

Scenario	Modeled strategy	GHG emissions reduced from current policy scenario, MMT CO_2e (%)	
		2035	2050
Plan implementation	Require all iron and steel production to be net-zero emissions by 2050 by replacing blast furnace-basic oxygen furnaces with hydrogen-based direct reduced iron technology with electric arc furnaces (H2-DRI-EAF).	6.4 (12%)	23.3 (50%)

Source: CMAP and E3, 2025.

2.2 Establish Buy Clean programs for cement and steel

Low-to-zero-emissions production methods for steel and cement remain more expensive than fossil-based methods, leaving many industrial operators reluctant to invest in decarbonization. Public infrastructure projects, such as roads, government buildings, and universities, represent a significant portion of demand for these emission-intensive materials, giving federal, state, and local governments a unique opportunity to create market incentives for low-emissions alternatives and lead by example.

Buy Clean procurement policies require low-emissions materials for major public works, helping grow demand and make it more economical for private companies to create or use these materials.

In 2021, the Federal Buy Clean Initiative began promoting the use of low-carbon materials, including a $2 billion investment for General Services Administration facilities and $1.2 billion to help state departments of transportation procure low-carbon materials.[107] These federal programs should be reinstated and expanded with low-carbon procurement. This would make it easier for the federal government to establish a net-zero cement production goal similar to the one established by California.[108] Until federal action is taken, states can follow the example of state-level Buy Clean policies in Colorado, Minnesota, and Washington, which set requirements for low carbon steel, cement, and other materials in state-funded projects.[109]

The plan assumes all three states implement emissions intensity requirements for cement and steel used in publicly funded projects starting in 2027 (Table 15). Modeling suggests these policies could reduce steel emissions by 7 percent and cement emissions by 23 percent by 2050.[110] It assumes the use of H2-DRI-EAF steelmaking and that cement production will decarbonize by switching from coal to gas and adopting energy efficiency improvements

Table 15. Establish state Buy Clean programs for cement and steel

Scenario	Modeled strategy	GHG emissions reduced from current policy scenario, MMT CO_2e (%)	
		2035	2050
State and local	Establish state Buy Clean programs to set emissions intensity requirements for cement and steel used in publicly funded construction projects.	0.8 (1%)	1.9 (4%)
Plan implementation	Require net-zero cement production by 2050, achieved using low-carbon cement alternatives, shifts in the fuel used in production, and/or carbon capture and storage.	0.1 (0.3%)	0.3 (1%)

Source: CMAP and E3, 2025.

2.3 Support electrification of natural gas use for process and facility heating

Industrial natural gas demand is largely driven by the need for facility and process heat — energy needed for tasks like drying, baking, and firing. These uses create significant emissions across a wide range of industries and facilities, from huge mills to small manufacturers, and from food processers to glass producers. Importantly, several industry subsectors with major presences in the region, such as chemicals, food and beverage processing, and paper and pulp, have commercially available electrification pathways.[111]

While certain industrial systems, such as blast furnaces, are unique and require tailored decarbonization approaches, other more common equipment like boilers, water heaters, and low-temperature process heaters have commercially available electric alternatives. To reach the region's climate goals, the plan assumes that all process and facility heating below 140 degrees Celsius (284°F) is electrified by 2050 (Table 16).[112]

Policy measures such as equipment emissions standards, technical assistance, and financial incentives can accelerate the adoption of electric and low-emissions industrial heating. Standards like those enacted by the Southern California Air Quality Management District can phase out fossil fuel use and reduce co-pollutants like nitrous oxide, delivering health co-benefits to nearby communities.

For higher-temperature heating needs that use natural gas, or where electric alternatives are not yet commercially viable, the plan assumes that up to 11 TBtus of remaining on-site combustion will be supplied with renewable natural gas from waste feedstocks by 2050. See the energy generation chapter for more details.

Table 16. Electrify low-temperature processes

Scenario	Modeled strategy	GHG emissions reduced from current policy scenario, MMT CO_2e (%)	
		2035	2050
Plan implementation	Electrify low-temperature processes (e.g., process heating, boilers, and cogeneration below 140°C) by 2050.	2.6 (5%)	5.6 (12%)

Source: CMAP and E3, 2025.

2.4 Provide strategic financing and coordination

Federal, state, and local governments should provide financial support to help companies cover capital and operating costs associated with electrification and low-to-zero-carbon fuels and energy sources. Given constrained local resources and uncertain federal funding, investments should target the highest-emitting subsectors — iron and steel, petroleum refining, chemicals, and food and beverage processing — and help companies comply with emissions standards. Utility commissions, such as the Illinois Commerce Commission, can make electrification more economically feasible by reforming electricity rates and advancing demand response programs to lower costs for applicable industrial users. Commercial Property Assessed Clean Energy programs and the Illinois Climate Bank also provide financing for industrial businesses for energy efficiency, renewable energy, resilience, and water conservation projects.

Coordination across stakeholders is critical to achieving decarbonization at scale. Forums that bring together utilities, manufacturers, trade unions, governments, and technical assistance providers — building on models like Massachusetts' Energy Efficiency Advisory Council or the Renewable Thermal Collaborative — can align strategies, fill long-term planning gaps, and drive bold action. Subsector-specific cohorts can provide direct feedback from facility managers, connect companies to resources, and develop actionable plans to accelerate electrification and low-to-zero-carbon fuel and feedstock adoption.

Considerations for carbon capture and storage

Carbon capture and storage (CCS) technologies capture carbon emissions at the source and either use them in industrial processes or store them permanently underground. While currently limited in deployment, U.S. projects capture 20 MMT CO_2e annually, primarily in the ethanol refining, natural gas processing, and ammonia production sectors. CCS is identified in the U.S. Department of Energy's 2022 Industrial Decarbonization Roadmap as a key tool for decarbonizing sectors like chemicals, refining, and cement.[113]

Despite this potential, CCS carries significant environmental and community risks. Past leaks have caused hospitalizations and aquifer contamination in downstate Illinois. Advocates caution that reliance on CCS could allow facilities to delay other pollution reduction measures, perpetuating health burdens in already impacted communities.

While U.S. Steel and Cleveland-Cliffs have both proposed carbon capture projects at their northwest Indiana facilities, these efforts are not yet operational, and their status is uncertain following federal funding cuts to emissions reductions programs. Additional planning, land acquisition, and infrastructure development would be required before these or other CCS projects move forward in the region. Geologic carbon storage is not feasible within the 13 counties covered in this plan, meaning any captured carbon intended for underground storage would need to be transported out of the region via pipeline. The Illinois Basin, a subarea of the Mt. Simon sandstone reservoir which stretches across much of the Midwest, is geologically well-suited for carbon storage. Archer-Daniels-Midland is actively using it to store carbon underground near Decatur, Illinois.[114]

Indiana and Illinois have established regulatory frameworks for CCS, while Wisconsin has not. In 2022 and 2023, Indiana passed legislation enabling CCS in the state and establishing rules around permitting, pipelines, and pore space ownership.[115] In 2024, Illinois passed the SAFE CCS Act, which also established a regulatory framework for CCS, including the need to evaluate proposed project impacts on water resources, a requirement that projects will not result in net increases in emissions, and monitoring requirements.[116] Moving forward, regulators and researchers should continue to assess the full lifecycle costs, emissions trade-offs, and community impacts to determine where CCS can safely complement other industrial decarbonization strategies.

While not included in the plan implementation scenario, limited CCS implementation was modeled to assess its potential impact on regional industry emissions. Applied to chemical production, cement production, and petroleum refineries, CCS yielded additional reductions of 2.6 MMT of CO_2e by 2050, compared to the current policy scenario (Table 17). However, modeling showed that the industrial sector can achieve necessary reductions without relying on CCS if the other decarbonization strategies from this plan are successfully implemented. Given the effectiveness of other reduction measures and significant stakeholder concerns, CCS is not identified as an implementation pathway in this plan. Nevertheless, as CCS technology continues to evolve, it will likely remain a part of regional and national discussions around industrial decarbonization.

Table 17. Implement carbon capture and storage for cement and petroleum refineries

Scenario	Modeled strategy	GHG emissions reduced from current policy scenario, MMT CO_2e (%)	
		2035	2050
Plan implementation	Apply CCS to industries with emissions that remain after efficiency improvements and fuel switching, including cement and petroleum refining, achieving a 100% reduction in cement emissions and a 40% reduction in refinery emissions by 2050. The model assumes CCS is applied to all remaining cement emissions and 30% of remaining refinery emissions.	1.0 (2%)	2.6 (6%)

Source: CMAP and E3, 2025.

To guide future CCS planning, states and counties should:

- **Prioritize safety, community perspectives, and long-term decarbonization.** CCS planning should focus on the safety and perspectives of communities already burdened by industrial pollution. Residents in and near potential CCS sites must have a meaningful role in shaping how and whether projects move forward. Strong collaboration and engagement can help ensure that any CCS use includes rigorous environmental safety measures and aligns with the region's industrial decarbonization and fairness goals.
- **Limit CCS deployment when other viable decarbonization pathways exist.** Many existing CCS projects are tied to fossil fuel-based industries such as refineries and gas and coal power plants — facilities incompatible with a decarbonized future. Policymakers should prioritize decommissioning of fossil fuel operations and advancing efficiency, electrification, and low-to-zero-carbon fuels and feedstocks before considering CCS. Given current technology's inability to fully abate emissions, added energy demands, and community concerns, CCS should be used only when no cleaner, lower-risk options are available.[117]

06

Commercial and residential buildings

About this chapter

This chapter outlines commercial and residential buildings' roles in achieving the region's reduction targets, including current conditions, modeled scenarios, and key objectives and strategies. It shows how coordinated action across state, local, federal, and private partners can deliver a 95 percent reduction in building emissions by 2050, with select measures quantified to show the scale and pace of change required.

Commercial and residential building objectives and strategies

1. Encourage compact and efficient development

1.1. Increase multifamily and attached homes

1.2. Promote transit-oriented development

2. Update building standards

2.1. Adopt energy-efficient building codes

2.2. Adopt all-electric new construction requirements

2.3. Adopt energy benchmarking policies

2.4. Adopt building performance standards

2.5. Reduce development code barriers to on-site energy generation

3. Advance clean heat and appliances

3.1. Advance appliance standards to sustain energy efficiency and achieve full electrification

3.2. Accelerate adoption of electric appliances, particularly heat pumps

3.3. Reduce hydrofluorocarbon use in appliances

4. Transform existing buildings

4.1. Weatherize residential and commercial buildings, with targeted support for low- and moderate-incomes homeowners and renters

4.2. Advanced grid-interactive buildings with behavior change and smart management

4.3. Accelerate on-site energy generation

4.4. Develop neighborhood-scale energy solutions

5. Increase use of low-carbon materials

Decarbonizing the region's homes, businesses, and public buildings is essential to meet the region's climate goals and build a more affordable, resilient, and healthy future. Because decisions about land use, building codes, and development occur primarily at the state and local levels, most of the region's building sector reductions will come from local action. Meeting these goals requires improving energy efficiency, electrifying heating systems, expanding clean electricity, and ensuring all communities benefit from the transition. These actions will not only reduce GHG emissions but also lower energy costs, improve indoor air quality, and reduce long-term energy demand.

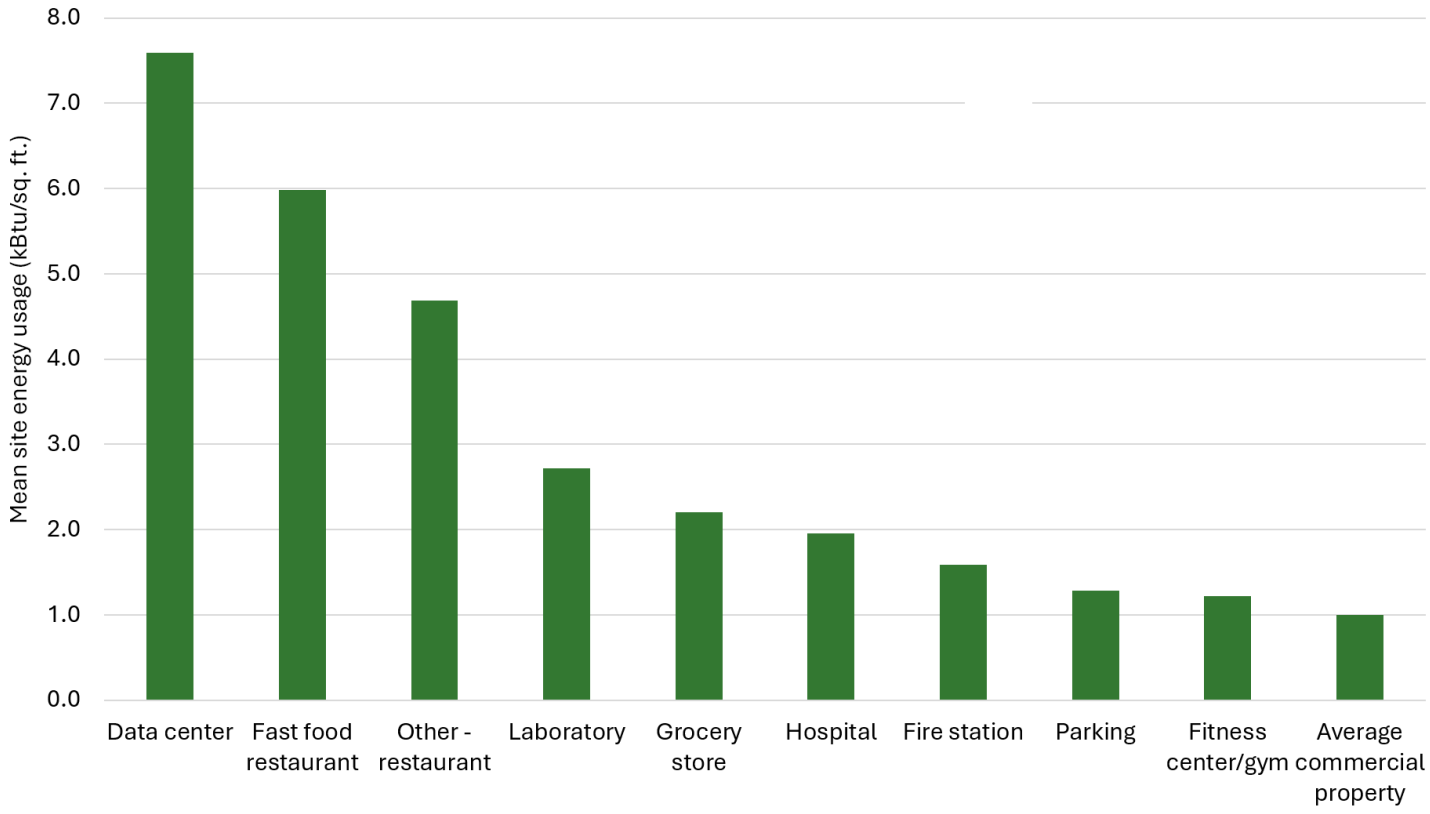
Natural gas dominates building emissions

Buildings account for 35 percent of the region's total emissions (54 MMT CO_2e), with roughly 60 percent from on-site natural gas use and 40 percent from electricity consumption. Residential buildings, over 4 million housing units, produce nearly half of these emissions, mostly from natural gas used for space and water heating (Figure 19). Commercial and institutional buildings, totaling 2.2 billion square feet (sq. ft.), contribute the remaining share, with emissions driven by heating, cooling, and lighting, as well as energy-intensive operations, such as data centers and fast-food restaurants (Figure 20).

Figure 19. On-site natural gas and electricity emissions by residential and commercial buildings, 2020

Source: CMAP 2020 GHG Inventory, 2024.

Figure 20. Energy intensive commercial property types by mean energy usage per square foot in the Chicago metropolitan statistical area, 2020



Note: The Chicago metropolitan statistical area (MSA) consists of 14 counties, compared to 13 in the plan. The MSA includes Jasper and Newton counties in Indiana, which are not part of the plan, while the plan includes La Porte County, Indiana, which is not part of the MSA.

Source: Energy STAR Portfolio Manager, 2025.

Older buildings drive retrofit needs

Progress has already begun: building-related emissions have fallen by 18 percent since 2005, driven largely by a cleaner electric grid and stronger appliance and building standards. Yet rising natural gas use, particularly in commercial buildings, has limited overall reductions.

With an aging building stock and continued demand for new construction, decarbonizing this sector is both urgent and complex. Roughly 51 percent of residential units were built before 1969,[118] typically reflecting older construction practices and lower baseline efficiency. Retrofitting existing buildings is essential but costly, requiring sustained and targeted funding to meet the needs of diverse building types, ownership and financing models, and household incomes.

At the same time, nearly one million new homes and significant commercial space are anticipated by 2050, making the form, location, and efficiency of new construction critical to the region's emissions trajectory. Ensuring that new buildings are highly efficient and all-electric will be essential to keeping the region on track to meet its climate targets. While the region's commercial building stock is relatively newer, the sector is also adding energy-intensive uses, such as data centers, making decarbonization more dependent on building use, operational practices, and access to clean power than on building age alone.

Affordability and capacity are key challenges to overcome

Delivering this transition poses significant affordability and capacity challenges. More than one-quarter of households in Greater Chicago already spend over 30 percent of their income on housing, limiting their ability to invest in efficiency upgrades or electrification.[119] Without sustained public investment and fair program design, higher-income households and larger commercial property owners are more likely to electrify first, while lower-income households and small businesses face rising gas costs as fixed system costs are spread across fewer customers. Renters face additional barriers, as landlords may underinvest in efficiency when tenants capture the savings, or pass retrofit costs through higher rents — raising the risk of displacement.

Reaching the 2050 target

The commercial and residential building sector must reduce emissions by 95 percent below 2005 levels by 2050 to meet regional climate goals. Achieving this transformation presents a powerful opportunity to cut emissions while creating healthier, more affordable, and more resilient buildings. Doing so will require coordination among state and local governments, utilities, developers, and the trades to accelerate energy efficiency, electrification, and clean energy adoption.

Current policy scenario

If no new policies are adopted, building emissions are still expected to fall by 37 percent below 2005 levels by 2050, driven primarily by Illinois' cleaner electricity mix under CEJA. While significant, this reduction falls short of the region's climate target (Figure 21).

Plan implementation scenario

This scenario reflects modeled reductions from 8 of the 14 building strategies, resulting in steep declines in space heating and other energy end uses (Figure 21).[120] Federal action — through appliance standards, market-shaping investments, and tax incentives — can accelerate progress, while state and local policies ultimately drive transformation. It achieves the 95 percent reduction target, based on five objectives:

1. Encourage compact and efficient development.
2. Update building standards.
3. Advance clean heat and appliances.
4. Transform existing buildings.
5. Increase use of low-carbon materials.

State and local role

Of the total emissions reductions needed relative to 2005, actions led by state and local governments would help the region achieve over three quarters of the necessary reductions needed by 2050 (Figure 22). While federal partnership remains important, state and local governments hold primary authority over land use, building codes, and development decisions, giving them a decisive role in shaping building sector outcomes. This underscores the pivotal importance of regional and municipal action in advancing clean, efficient, and healthy buildings.

Figure 21. Commercial and residential building emissions reductions by subsector under the plan implementation scenario, MMT CO_2e (2005-2050)

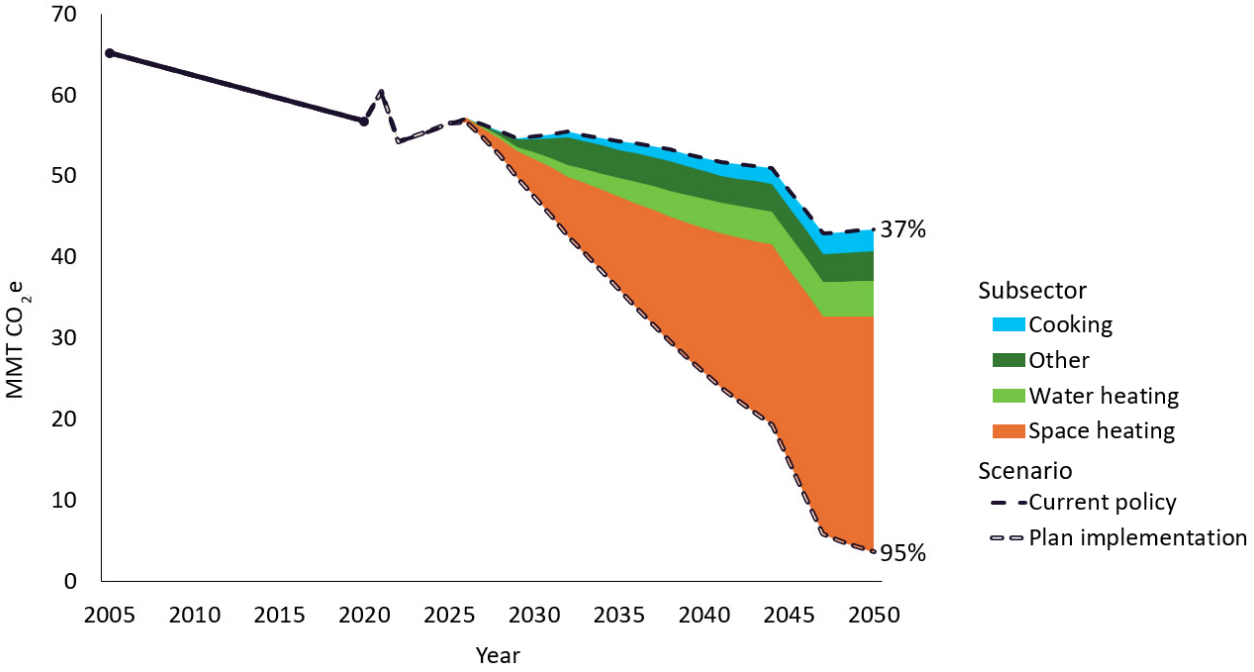
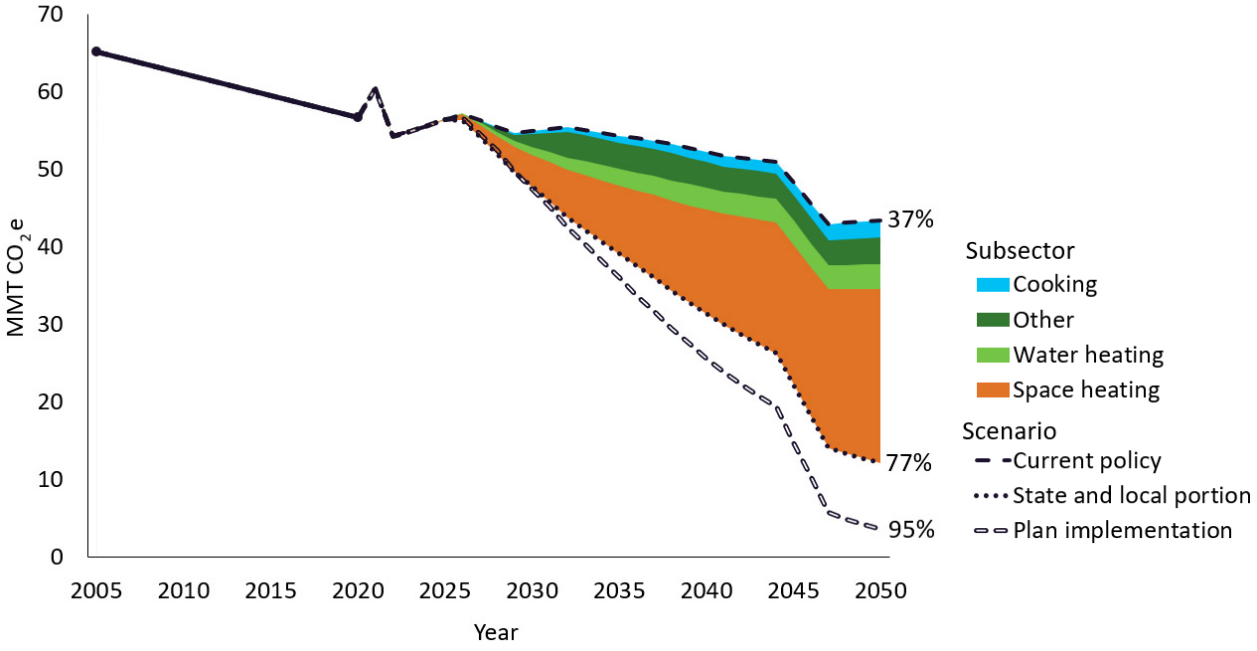


Figure 22. Commercial and residential building emissions reductions by subsector for the state and local implementation scenario, MMT CO_2e (2005-2050)



Note (for both figures): The "other" subsector includes activities such as commercial and residential lighting, refrigeration, and air conditioning.

Source (for both figures): CMAP and E3, 2025.

The following objectives and strategies detail specific actions needed by federal, state, and local governments, utilities, and industry partners to deliver these reductions. Find details on modeled strategies in Appendix D.

Objective 1: Encourage compact and efficient development

Land use and development policies shape the types, sizes, and locations of buildings and activities, and the distances people must travel between them. By 2050, the region is projected to add nearly one million new housing units and significant commercial square footage, representing an opportunity to shape growth in ways that reduce long-term emissions.[121] Compact, mixed-use, and infill development supports smaller spaces and shared-wall designs that can cut heating and cooling demand. Focusing growth within infill and higher-density areas makes it easier for residents and employees to access jobs, services, and amenities by transit, biking, and walking, while preserving open space and ecosystems that provide carbon sequestration. See the transportation and natural carbon sequestration chapters for more details.

1.1 Increase multifamily and attached homes to reduce energy demand

Multifamily and attached homes use significantly less energy per household than detached single-family homes, making them critical to meeting building sector targets. Smaller households, an aging population less interested in large homes, and a rising demand for housing near transit also underscore the need for more diverse housing options. Local governments can respond by updating zoning to allow multifamily, duplexes, triplexes, townhomes, and accessory dwelling units by right in more areas. Even modest reforms, such as permitting attached single-family homes where only detached are allowed, can expand choice and deliver efficiency gains. Additional steps — eliminating minimum lot sizes, easing height and setback restrictions, reducing parking minimums, and allowing higher floor area ratios — further support compact, energy-efficient construction.

Achieving the building sector target requires increasing the share of new multifamily and attached single-family or townhouse construction. Regional plans already anticipate this shift, projecting growth from 47 percent of new housing units today to 71 percent by 2050 with implementation of compact, mixed-use, and infill development strategies in ON TO 2050 and NWI 2050 (Table 18).[122] Realizing these outcomes, however, depends on consistent local action to update zoning codes, streamline approvals, and align development decisions with regional goals.

A municipality-by-municipality approach can be slow and lead to uneven outcomes. Some states have adopted statewide legislation to expand by-right housing options — such as Oregon's HB2001 (2019) and Washington's HB1110 (2023) — helping to accelerate housing production and support more efficient, lower-emission development patterns.[123] Similar statewide approaches may be necessary in Illinois, Indiana, and Wisconsin to meet building sector targets.

Table 18. Increase multifamily and attached homes to reduce energy demand

Scenario	Modeled strategy	GHG emissions reduced from current policy scenario, MMT CO_2e (%)	
		2035	2050
State and local	Expand investments and policies supporting smaller, denser development, increasing multifamily and townhouse construction from 47% to 71% starting in 2026.	0.3 (0.6%)	0.5 (1%)

Source: CMAP and E3, 2025.

1.2 Promote transit-oriented development

Transit-oriented development is essential to reducing emissions and expanding housing choices. Clustering housing, offices, retail, and other uses near transit reduces car trips and can generate valuable real estate.

Density is crucial to maximize benefits; research conducted by Transit Matters and Boston Indicators in the greater Boston area suggests at least 15 people per acre are needed to support moderate transit service such as buses running at 30-minute intervals, and 40 people per acre for more intensive transit such as subways and high-frequency rail.[126] In northeastern Illinois, the Regional Transportation Authority's recent assessment found that the majority of areas around transit stations do not meet their minimum density for transit-oriented land use.[127]

States can accelerate transit-oriented development by creating programs that offer grants, loans, and tax credits to redevelop underused land near transit, and by aligning existing programs, such as Economic Development for a Growing Economy credits, sales tax rebates, tax increment financing, and low-income housing tax credits, with transit-supportive projects.[128] Aligning transit agency authorities, incentives, and policies that support their ability to carry out joint development and capture value from transit investments could further expand opportunities.[129] Indiana, for example, recently passed state legislation authorizing cities in northwest Indiana to establish transit development districts,[130] while Illinois' newly created Northern Illinois Transit Authority will provide a regional framework to coordinate investment and grant limited development authorities around key transit assets. Together, these efforts position both states to better link land use, economic development, and climate goals.

Municipalities can complement these efforts by updating zoning around transit stations and bus routes to allow high-density infill and by streamlining approvals to reduce costs and delays. Local examples, such as Blue Island, Illinois' transit-oriented development zoning district, show how clear standards and faster permit reviews can deliver compact, transit-oriented growth quickly.

Objective 2: Update building standards

For an effective energy transition, states and municipalities must adopt regulations, codes, and standards that require new or substantially renovated buildings to use less energy, integrate efficient electric systems, and support on-site renewable generation, such as rooftop solar. These policies are among the most cost-effective tools for securing long-term energy savings, with benefits that compound as the grid becomes cleaner. For existing buildings, this means requiring retrofits or other changes that trigger code compliance with advanced energy efficiency upgrades. For new buildings, it means ensuring that every project is energy efficient and electric-ready — that is, equipped with the wiring, panel capacity, and conduit needed to support full electrification of appliances, heating, and vehicle charging without costly retrofits later — to prevent decades of fossil fuel use. To avoid a patchwork of regulations across different jurisdictions, these reforms should be implemented at a statewide level to create consistency, reduce administrative burdens, and provide certainty for builders, owners, and consumers.

Source: Elevated Chicago.

Mixed-use affordable housing with clean energy amenities

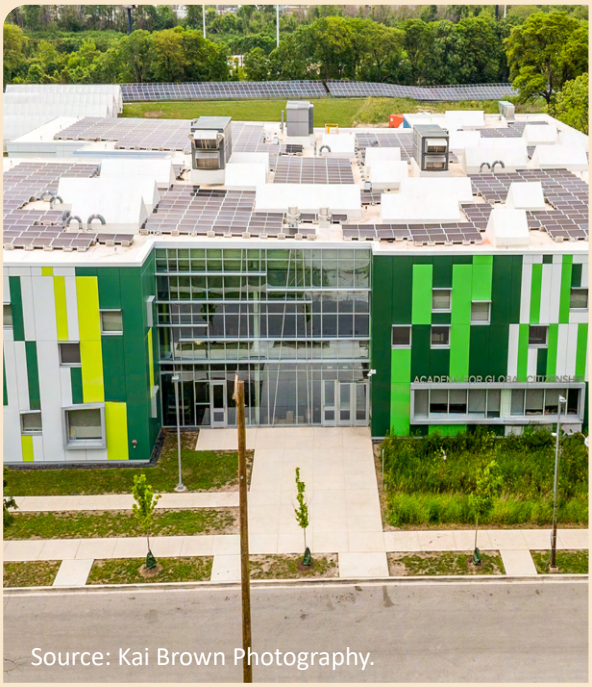
Fifth City Commons is a mixed-use affordable housing and transit-oriented development on a vacant lot near the Kedzie Green and Blue Line CTA stations in Chicago's East Garfield Park neighborhood.[124] The development provides reduced parking (13 spots for a 43-unit building) with two EV charging stations; meets Passive House building standards; provides on-site composting; and will eventually feature rooftop solar panels. It is one of the first developments to take advantage of the City of Chicago's Connected Communities Ordinance; across the street, a second phase is planned and will offer limited equity cooperative homeownership.[125]

2.1 Adopt energy-efficient building codes

Local enforcement of current energy codes is a foundational step in lowering energy demand in both new construction and major renovations. Building codes set minimum energy efficiency standards for insulation, heating and cooling systems, window performance, and other key components. Federal law requires states to adopt the International Energy Conservation Code (IECC), a standard updated every three years by the International Code Council.[131] Prompt adoption of its latest version at state and local levels is one of the most cost-effective ways to achieve long-term energy savings.

Illinois has adopted the 2021 IECC standards and an optional stretch code created under CEJA, which allows municipalities to exceed statewide standards.[132] While the stretch code provides flexibility, optional adoption creates a patchwork of standards and uneven access to efficiency benefits. Evanston has already implemented it, and broader adoption would accelerate energy savings across the state.[133] The Illinois Climate Bank offers grants to help municipalities transition, while programs such as the Advanced Building Energy Efficiency Policy Task Force — a partnership between the Metropolitan Mayors Caucus, Midwest Energy Efficiency Alliance, and Slipstream, funded by ComEd — provide technical assistance and support.[134]

In Indiana and Wisconsin, residential codes remain essentially equivalent to 2009 IECC standards, while commercial codes adhere to outdated American Society of Heating, Refrigerating and Air-Conditioning Engineers benchmarks.[135] Indiana adopted the 2018 International Residential Code for residential buildings but subsequent state amendments reduced energy efficiency requirements by over 15 percent.[136] Additionally, municipalities in both Indiana and Wisconsin are prohibited from adopting stricter standards, limiting communities' ability to pursue higher efficiency. Upgrading to the 2021 IECC could save households 14 to 22 percent annually, translating to hundreds of dollars in avoided energy costs.[137]


Source: Kai Brown Photography.

Academy for Global Citizenship

The Academy for Global Citizenship, an early-childhood and K-8 public charter school on Chicago's Southwest Side, demonstrates how high-performance building design can advance climate goals while delivering community benefits. The project was led by SMNG A Ltd. with collaboration from Farr Associates. The new campus is designed to achieve net-positive energy — producing its annual electricity needs through on-site renewables — and net positive water through integrated rainwater collection, reuse, and treatment. Exposed, monitored building systems turn real-time energy, water, and air quality data into a teaching tool, illustrating how all-electric, net-zero buildings can advance climate education. The academy recently completed a one-year test period and generated 107 percent of all annual energy.

2.2 Adopt all-electric new construction requirements

All-electric building requirements prevent long-term reliance on fossil fuel infrastructure and are critical to reducing natural gas demand, particularly for heating — the largest residential use. Achieving the building sector target requires that all newly constructed homes — approximately 900,000 units — are equipped with all-electric cold climate air source heat pumps, water heaters, cooktops, and clothes dryers. This would reduce emissions in 2050 by approximately 9 percent relative to the current policy scenario (Table 19). Expanding to some commercial buildings would result in additional reductions.

In Illinois and Wisconsin, municipalities can adopt ordinances to require all-electric new buildings, as Oak Park, Illinois, has done, allowing fossil fuels only for emergency backup.[138] Indiana currently restricts municipalities from adopting bans on natural gas hookups, highlighting the need for state-level reform to enable local action.[139]

States could also consider adopting a statewide policy to avoid piecemeal adoption.[140] New York provides an example of effective policy, requiring new buildings seven stories or fewer to be all-electric by 2026. Taller residential and smaller commercial buildings must comply by 2029. The state provides exemptions for certain facilities, like hospitals, factories, and agricultural buildings, and allows fuel-based emergency backup, similar to Oak Park's approach.[141]

Table 19. Adopt all-electric new construction requirements

Scenario	Modeled strategy	GHG emissions reduced from current policy scenario, MMT CO_2e (%)	
		2035	2050
State and local	Require all new construction homes to be all-electric starting in 2027.	1.3 (2%)	4.0 (9%)

Source: CMAP and E3, 2025.

2.3 Adopt energy benchmarking policies

Benchmarking ordinances require large buildings owners to track and report whole-building energy use, offering multiple benefits for owners, tenants, and policymakers. Benchmarking helps owners identify inefficiencies and prioritize retrofits, provides investors with data to evaluate long-term competitiveness and resilience, and helps tenants make informed decisions.

Coordinated approaches at the county, regional, or state level can help scale these benefits and create consistency across jurisdictions. Statewide frameworks remain preferable, as they reduce administrative burdens on local governments and provide a strong platform to deliver technical assistance and incentives that encourage benchmarking. Reliable reporting platforms, such as the USEPA's ENERGY STAR Portfolio Manager, are essential for ensuring compliance and measuring progress. States should also require utilities to provide whole-building energy data to streamline reporting, especially for rental properties. Illinois' Clean and Reliable Grid Act took this initial step by requiring utilities to provide building owners with utility data that will enable benchmarking and increase access to federal funding.[142] Municipalities and counties in the region have also begun establishing programs, with thresholds ranging from 10,000 to 50,000 sq. ft., depending on building type.[143]

2.4 Adopt building performance standards

Building performance standards (BPS) set long-term energy or emissions reduction targets for existing, large commercial, multifamily, and public buildings. They are one of the most effective tools for transforming existing buildings, backed by strong institutional support from organizations such as the Urban Land Institute, Midwest Energy Efficiency Alliance, and Illinois Green Alliance.

To meet the building sector reduction target, the region needs to adopt performance standards that reduce building emissions by 9 percent by 2035 and 37 percent by 2050 relative to the current policy scenario (Table 20). Achieving this would require state-level legislation establishing consistent performance standards across the region, requiring buildings above certain size thresholds to reduce their emissions by 20 percent by 2035 and 80 percent by 2050. Statewide leadership is essential to ensure administrative capacity, consistency,

Table 20. Adopt building performance standards

Scenario	Modeled strategy	GHG emissions reduced from current policy scenario, MMT CO_2e (%)	
		2035	2050
State and local	Require large existing buildings over 50,000 sq. ft. to cut emissions 20% by 2035, and those over 25,000 sq. ft. to achieve 80% reductions by 2050.	4.8 (9%)	16.1 (37%)

Source: CMAP and E3, 2025.

and competitiveness among jurisdictions, though coordinated county or regional approaches could help advance early implementation if state action is delayed.

Modeled after Colorado's buildings performance program, initial standards would apply to larger buildings — commercial buildings over 50,000 sq. ft. and multifamily buildings with five or more units and eight stories.[144] By 2035, BPS would expand to include commercial buildings over 25,000 sq. ft. and multifamily buildings with five or more units and four stories, gradually encompassing a broader range of building types.

Effective BPS require clear, enforceable standards, supported by administrative capacity and financial assistance. Statewide standards are preferable: they prevent a patchwork of local ordinances, simplify compliance for developers and building owners, reduce administrative burdens on local governments, and enable faster rollout and application across a larger number of buildings. Municipal action, however, remains essential to successful implementation — local governments can lead by adopting benchmarking ordinances, piloting BPS frameworks, and aligning building permitting and retrofit programs with statewide goals. Benchmarking is a critical component, as it provides the data needed to set and measure performance targets. Early engagement with building owners, developers, and community representatives ensures practical, fair standards, while alternative compliance pathways and robust financial incentives help make the BPS accessible and encourage adoption across all building types. Several regional partners provide research, training, and technical assistance to help local governments and building owners implement and comply with the BPS frameworks.[145]

Building Performance Colorado program

Colorado's HB21-1286 (2021) created the Building Performance Colorado program, setting energy and emissions standards for buildings. The law directed the Colorado Energy Office to convene an 18-member task force, representing building owners, affordable housing, developers, contractors, architects, trades, utilities, local governments, environmental groups, and building performance standards experts, to propose rules and compliance pathways.

Standards took effect in 2023 with a 2026 deadline for compliance, which was later amended to 2030. Buildings can comply by reducing energy use intensity or GHG intensity. Alternate pathways provide flexibility for financial hardship, timing of major capital upgrades, and exceptions for select building types. To aid implementation, the program required benchmarking of large buildings ahead of full building performance standards implementation. In addition, it created the Building Decarbonization Enterprise to deliver technical and financial assistance, including facilitating on-bill financing, energy audits, and expert guidance.

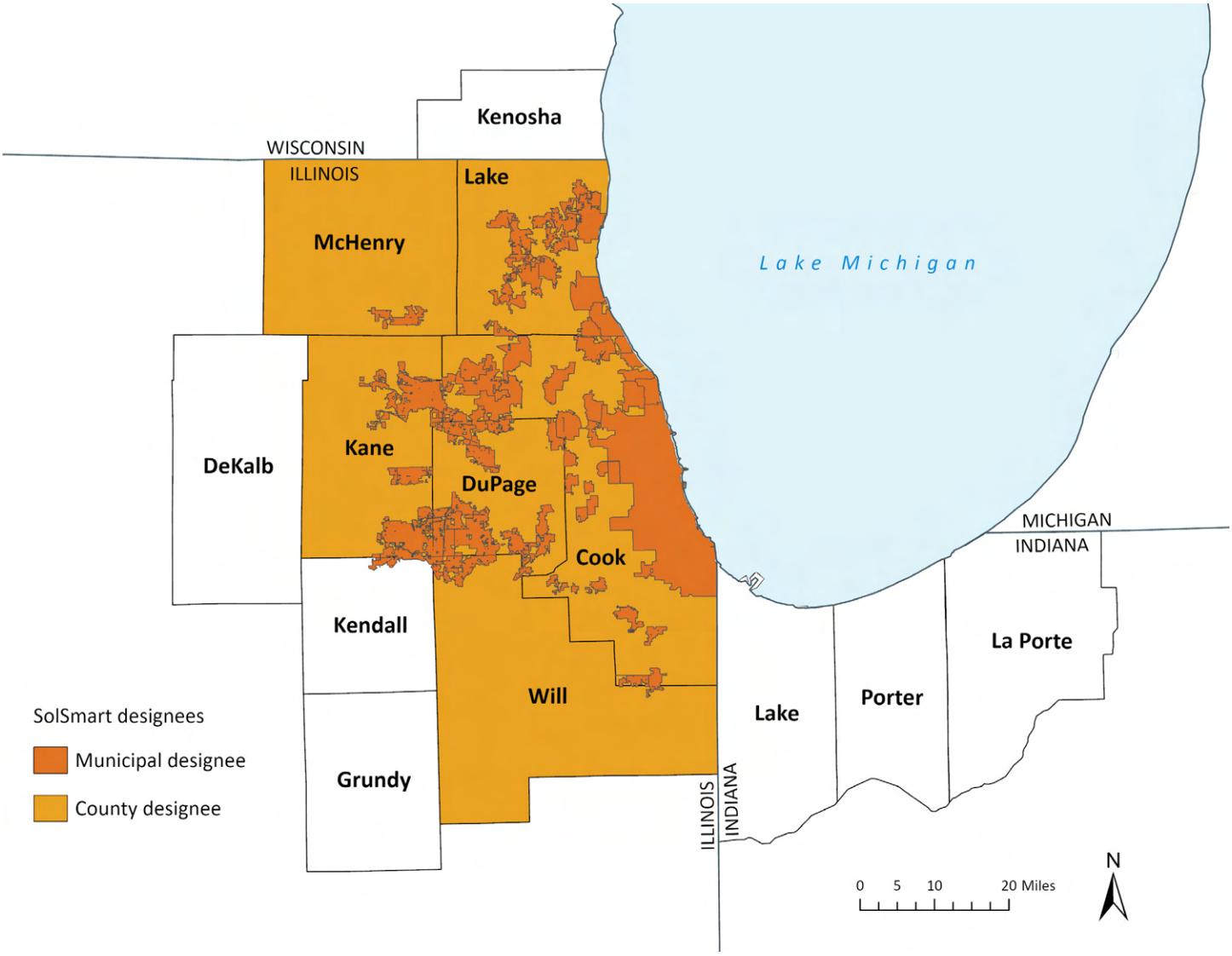
2.5 Reduce development code barriers to on-site energy generation

On-site energy generation, such as rooftop solar, small wind, battery storage, shallow geothermal, and other distributed energy resources, can reduce building operating costs, strengthen grid resilience, and accelerate the transition to clean power. Yet despite falling hardware prices, high soft costs such as permitting, inspections, and financing remain a major barrier to adoption, often accounting for nearly half the total project expense.[146]

To address these challenges, Illinois is exploring ways to expand markets and regulatory certainty for distributed energy, along with transmission upgrades, load planning, and streamlined interconnection — approaches that Wisconsin and Indiana should also pursue to accelerate deployment across the region. Recent updates through Illinois' Clean and Reliable Grid Act also reduce local governments' ability to restrict solar installations, beginning to establish a framework akin to a "Solar Bill of Rights" that protects consumers' ability to generate and use solar energy without unnecessary barriers.

At the local level, counties and municipalities can support deployment by simplifying permitting, updating zoning codes to be explicitly solar-friendly, and requiring solar-ready provisions in new construction, which further reduce future retrofit costs. Many communities in the region already hold SolSmart certifications — a program providing technical support, tools, and recognition for municipal and county governments to better enable rooftop solar development (Figure 23).[147] There are additional resources, such as the Great Plains Institute's model solar ordinances for Illinois, Indiana, and Wisconsin, which provide guidance on solar installations, ranging from rooftop solar to utility-scale solar.[148]

Figure 23. Map of SolSmart designated communities



Note: The SolSmart designation for McHenry County encompasses Region 1 Planning Council's Economic Development District of McHenry, Boone, and Winnebago counties.

Source: SolSmart, 2025.

Objective 3: Advance clean heat and appliances

A significant share of building-sector emissions comes from natural gas use in furnaces, boilers, water heaters, ovens, stoves, dryers, and other appliances. Most homes in the region rely on natural gas for space heating, while commercial buildings depend on fossil fuels for heating, cooking, and specialized equipment. Replacing these systems with electric technologies, such as heat pumps for space and water heating, induction cooktops, and electric clothes dryers, can significantly cut emissions.

As the grid gets cleaner, each switch from gas to electric equipment yields additional climate benefits. Further gains will come from reducing hydrofluorocarbon use in appliances like refrigerators, air conditioners, and heat pumps, as these refrigerants are potent GHGs. Together, electrification and refrigerant phase-down also improve indoor air quality and reduce exposure to harmful pollutants. However, many older homes — particularly in disinvested areas — require significant repairs and electrical upgrades before electrification is feasible, underscoring the need for dedicated funding to prepare buildings for clean energy improvements.

Progress in reducing building emissions has long been driven by appliance efficiency standards and federal programs such as ENERGY STAR, which deliver significant cost savings while accelerating market transformation. Continued federal leadership is essential to maintaining and strengthening these programs. States can reinforce standards, adopt more stringent requirements where federal rules do not apply or exist, regulate emissions from fossil-fuel-burning appliances (e.g., nitrogen oxides), and create complementary policies to accelerate electrification and sustain energy savings.

3.1 Advance appliance standards to sustain energy efficiency and achieve full electrification

Federal appliance efficiency standards set minimum performance requirements and, in some cases, prohibit the manufacture or sale of inefficient products. Energy efficiency standards can help accelerate electrification by pushing appliance manufacturers to focus on more energy-efficient models, which are often electric. Strengthening these standards is essential to achieving the plan's building-sector reduction targets, which require that 100 percent of sales for new building heating and cooling equipment and appliances (stoves, dryers, water heaters) are all-electric by 2035 (Table 21).

Aligning state standards with federal requirements provides a clear regulatory pathway for consistent adoption of high-efficiency electric technologies across residential and commercial buildings. Illinois SB 1582 (currently in committee) would establish the state's first Appliance Standards Act, directing the Illinois EPA to set minimum efficiency requirements for a variety of products.[149] Expanding standards to cover major building appliances would accelerate the transition to all-electric buildings.

Table 21. Fully electrify buildings

Scenario	Modeled strategy	GHG emissions reduced from current policy scenario, MMT CO_2e (%)	
		2035	2050
Plan implementation	Establish energy efficiency standards, accelerating the sales of all-electric appliances for space heating, water heating, cooking, and clothes drying, until they reach 100% by 2035.	10.1 (19%)	32.4 (75%)

Source: CMAP and E3, 2025.

3.2 Accelerate adoption of electric appliances, particularly heat pumps

Widespread electrification of heating and appliances — especially through heat pumps — is essential to meeting building sector reduction targets, but high upfront costs remain the biggest barrier. While heat pumps cut emissions, improve health, and lower bills, long payback periods make substantial, sustained incentives critical.

Federal programs under the Inflation Reduction Act (IRA) drove adoption and should be reinstated and expanded, with states and utilities building on this foundation. Programs like Massachusetts' Mass Save, which provides $10,000 to $16,000 in incentives for eligible households, show the scale of financial support required. ComEd and NIPSCO offer rebates on electric equipment and heat pumps, with deeper discounts available for income-eligible households.[150] Wisconsin's Focus on Energy program and Indiana's Energy Saver program

likewise provide rebates and technical support to help households and businesses adopt efficient, all-electric systems.[151] Building on existing programs in the region, Greater Chicago could scale incentives to match the ambition of leading programs like Mass Save (Table 22).

Many homes lack the electrical infrastructure (e.g., panels, wiring) required for new electric appliances, making grants, low-cost loans, and protections against rising utility costs essential to ensure low-income families benefit from electrification. States, federal agencies, and utilities should use multiple financing tools — rebates, tax credits, grants, on-bill financing, and mechanisms like Commercial Property Assessed Clean Energy (C-PACE) — to lower upfront costs and accelerate adoption.

Beyond cost, a cultural shift is needed. Coordinated campaigns that highlight performance, health, savings, and job creation can build public support, while outreach to contractors and industry stakeholders can reinforce consumer confidence. Workforce readiness is equally critical, requiring partnerships with unions, community colleges, and training providers to expand certification in heating, ventilation, and air conditioning (HVAC), plumbing, electrical, and building trades, alongside training for inspectors and code officials. These programs should prioritize underrepresented groups to support both equal access and broad economic benefits.

Table 22. Establish a heat pump incentives program

Scenario	Modeled strategy	GHG emissions reduced from current policy scenario, MMT CO_2e (%)	
		2035	2050
State and local	Provide $10,000 to $16,000 incentives for heat pump installations covering most heating needs between 2026 and 2050.	1.0 (2%)	3.3 (8%)

Source: CMAP and E3, 2025.

Breaking barriers to scale the clean energy transition

Scaling electrification, weatherization, and on-site renewable energy generation requires overcoming four systemic challenges: high up-front costs, ingrained consumer preferences, limited workforce capacity, and split incentives in rental housing. Addressing these barriers is essential to make the transition fair, affordable, and achievable, at scale.

Financial incentives and financing: Upfront costs remain the greatest barrier. It can take years to get energy savings and health benefits from investing in energy efficiency, weatherization, and renewable energy upgrades. Incentives must therefore be significant and accessible, delivered through utility programs, incentives, tax credits, rebates, on-bill financing, and private financing tools such as C-PACE.

Rate design and on-bill assistance: Rates should incentivize clean energy use and remain affordable. Utilities and regulators can test electrification-friendly rates that keep bills predictable and affordable, especially for heat pump users. Combined with bill and weatherization assistance for low-income households as well as time-of-use rates, these approaches ensure energy remains affordable during the clean energy transition.

Communication and messaging: Adoption depends on a cultural shift. Coordinated campaigns by federal, state, and local partners should first target residents who are likely to switch technology, focus on benefits, and address perceived and actual barriers to adoption (i.e., high cost, inefficiency, and inferior cooking experience).[152] Utilities with time-of-use and seasonal rates should encourage their customers to save money by using electricity during times of day or seasons when energy is cheaper and produced from cleaner sources.

Workforce development: The transition will stall without skilled labor. Expanding effective training and certification programs, partnering with unions and community colleges, and creating pathways from fossil fuel sectors into clean energy trades are critical. Programs must also be accessible — offering wraparound supports such as childcare, transportation, and bilingual training — and reach underrepresented communities through trusted local organizations. Partnering with unions and community colleges can strengthen the pipeline, while emphasizing job creation and long-term career opportunities in electrification and efficiency.

Renter protection and split incentives: Energy upgrades in rental housing risk displacing tenants unless paired with safeguards such as rent increase limits or eviction protections. Unlike owner-occupied buildings, landlords often lack a direct financial incentive to invest in efficiency or electrification, since tenants capture the energy savings. To overcome this split incentive, state and local partners can pair financial support, such as grants, rebates, on-bill financing, and green leases, with regulations like building performance standards, creating a structure where owners benefit from upgrades while tenants share the savings. Clear guidance, technical assistance, and funding support can encourage landlords to act, aligning economic and climate outcomes.

3.3 Reduce hydrofluorocarbon use in appliances

Hydrofluorocarbons (HFCs) are synthetic compounds used in refrigeration, air conditioning, heat pumps, and other applications. While developed as replacements for ozone-depleting chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons, HFCs are potent GHGs that trap hundreds to thousands of times more heat than an equal amount of carbon dioxide.[153] Phasing down HFCs in appliances is critical to ensure that gains from electrification and efficiency are not offset by refrigerant emissions.

At the federal level, the American Innovation and Manufacturing (AIM) Act of 2020 directs the USEPA to reduce HFCs 85 percent by 2036 through a phasedown program, technology transitions (which restrict HFC use in specific subsectors to speed the adoption of alternatives), and lifecycle rules for handling and disposal.[154] Sustained political, technical, and enforcement support is essential to finish implementing the program, ensuring the full climate impact of the AIM Act is realized.

State and local agencies can build on this framework by requiring low global warming potential cooling equipment in public procurement, targeting high-impact sectors such as cold-chain logistics and supermarkets, and incorporating leak detection and maintenance standards into building codes. Expanding workforce training on leak detection, repair, and safe handling prepares skilled labor to support the transition, while curated lists of low-global-warming-potential products from industry and trade associations can guide consumer and builder choices.

California has demonstrated the effectiveness of statewide efforts. Under California law, the state must reduce HFC emissions 40 percent below 2013 levels by 2030.[155] The fluorinated-gas reduction program offers incentives to grocery stores and supermarkets to adopt ultra-low-global-warming-potential refrigerant technologies. The state's Refrigerant Management Program requires large facilities to regularly inspect, report, and repair refrigerant leaks and maintain on-site service records.

Objective 4: Transform existing buildings

Most of the region's building stock will still be in place by 2050, and these existing structures account for a large share of emissions. New construction alone cannot offset the energy and carbon locked into aging buildings, making retrofits, electrification, and on-site clean energy generation critical to achieving climate targets. This section outlines strategies to improve energy efficiency, integrate distributed energy resources, leverage smart building technologies, and support neighborhood-scale clean energy solutions. Workforce development, financial incentives, and equal access are essential components to ensure these transformations are both widespread and inclusive.

4.1 Weatherize residential and commercial buildings, with targeted support for low- and moderate-income homeowners and renters

The federal Weatherization Assistance Program provides subsidized or free weatherization services to 32,000 income-eligible homes nationwide annually.[158] Recent federal changes have ended key weatherization incentives previously available under the IRA, including Section 179D's Energy Efficient Commercial Buildings Tax Deduction (sunsetting after 2026) and Section 25C's Energy Efficient Home Improvement Tax Credit (sunsetted after 2025).[159] To achieve regional goals, federal investment must be reinstated and expanded, scaling support to cover a greater share of low- and moderate-income households, and incentivizing energy-efficient retrofits in both residential and commercial buildings. Expanded federal programs should continue to cover insulation, air sealing, window upgrades, and electrical system improvements to enable future electrification.

Many homes in the region, especially older or lower-income housing, require substantial repairs before they can benefit from weatherization or electrification programs. Roof leaks, outdated wiring, or structural deficiencies can make participation infeasible even when incentives exist. Dedicated pre-electrification or home-readiness funds, modeled after Cook County's Healthy Homes for Healthy Families and Sun and Save programs, can help cover these critical repairs. Providing flexible funding for code compliance, safety upgrades, and roof or envelope work will ensure that those most in need are not left out of the transition to cleaner, healthier homes.

State and local agencies must also support these activities. States and utilities should implement large-scale weatherization programs to improve building envelopes and reduce energy use, while municipalities can partner to improve access to weatherization programs. Targeted support should focus on low- and moderate-income households through no-cost retrofits, grants, and financing for necessary repairs or electrical upgrades. Programs should also address the split-incentive challenge in rental housing through green leases, rent caps, and guaranteed tenant energy savings. Programs like Massachusetts' Mass Save provide a successful model, offering full-cost coverage for eligible households and demonstrating the scale and intensity needed to reach these targets.[160]

This support is critical to reach implementation rates where 50 percent of existing residential buildings and 72 percent of commercial buildings have weatherization upgrades by 2050 (Table 23).[161] State programs must achieve an annual retrofit rate of approximately 0.83 percent of residential units — about 35,314 homes per

year — resulting in nearly 900,000 homes retrofitted in the region by 2050. According to the American Council for an Energy Efficient Economy, these savings can be achieved through gradual home retrofits and periodic upgrades by large building owners seeking to maintain market competitiveness.[162] To achieve this scale of retrofit activity, state and local governments must create comprehensive programs that require energy use transparency; provide contractor training and certification; offer education, technical assistance, and incentives for building owners; and support research, program design, and financing mechanisms that improve participation and cost-effectiveness.[163]

Commercial buildings need comparable support to overcome high upfront costs and operational barriers. For example, NIPSCO in Indiana has a Small Business Direct Install Program — offering incentives to small businesses for energy efficiency improvements — to offset the upfront costs of energy efficiency investments. It also has a Strategic Energy Management Program targeting energy efficiency initiatives in schools, hospitals, and grocery stores.[164]

Table 23. Establish a weatherization incentives program

Scenario	Modeled strategy	GHG emissions reduced from current policy scenario, MMT CO_2e (%)	
		2035	2050
Plan implementation	Retrofit 50% of existing residential buildings and 72% of commercial buildings with weatherization upgrades by 2050.	1.0 (2%)	3.7 (8%)
State and local	Provide 100% cost coverage for weatherization upgrades in low- and moderate-income homes, improving efficiency in 21% of housing units (about 900,000 homes) by 2050.	0.4 (1%)	1.0 (2%)

Source: CMAP and E3, 2025.

Chicago Bungalow Association — a key Home Energy Savings Program partner

Funded by ComEd, Nicor Gas, Peoples Gas, and North Shore Gas, the Home Energy Savings Program provides free energy services and improvements to qualifying homeowners and renters. The program offers energy use assessments and weatherization improvements based on certain criteria.

The Chicago Bungalow Association (CBA) is a key program partner with a long track-record helping vintage homeowners access resources to weatherize their homes.[165] Between 2022 and 2024, the CBA completed 4,385 jobs that can be attributed to savings of up to 3.1 million therms and 5.3 million kWh. The CBA also helps customers navigate issues around deferred maintenance and provides resources on contractors, funding, how-to education materials, and more.

4.2 Advance grid-interactive buildings with behavior change and smart management

Even in highly efficient buildings, occupant behavior drives a large portion of energy use. Adjusting thermostat settings, running appliances during off-peak hours, and reducing unnecessary lighting are critical to maximizing reductions and minimizing impacts on the electric grid. States, local governments, and utilities should continue to promote programs that encourage these energy-saving behaviors through public education campaigns, incentives, and community outreach.

Tools such as demand response, dynamic pricing, and real-time energy feedback actively engage consumers in energy-saving behaviors while lowering costs and improving grid efficiency. The Metropolitan Mayors Caucus partners with utilities to provide energy efficiency education to low- and moderate-income households, helping residents take direct action to manage their energy use. Similarly, NIPSCO has a youth educational program, providing activities that promote energy efficiency and lower energy consumption at home and school.[166]

Certification programs also shift practices in larger buildings. The U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) program motivates property owners to pursue efficiency practices

and track performance. At 401 N. Michigan Avenue in Chicago, Walton Street Capital modernized its 1960s building with smart controls, scheduling optimization, leak detection, and lighting adjustments. These upgrades, paired with sustained staff training and other sustainability investments, reduced electricity use by 13 percent and natural gas consumption by 26 percent, earning the building a LEED Platinum certification.[167] Smart, grid-interactive buildings that use advanced controls, analytics, and distributed energy resources to respond dynamically to grid conditions complement behavior change. Technology like smart thermostats, occupancy and daylight sensors, smart electric vehicle chargers, and/or bidirectional charging can shift non-essential loads, integrate rooftop solar, and prioritize cheaper or cleaner energy to support grid reliability while reducing emissions. Building standards that incorporate energy use, efficiency ratings, or smart technology integration can incentivize adoption across the market.

Modeling of these strategies shows that smart building technologies could reduce residential HVAC and lighting energy demand by 10 percent and commercial building energy use by 16 percent by 2050 (Table 24).[168]

Table 24. Establish a weatherization incentives program

Scenario	Modeled strategy	GHG emissions reduced from current policy scenario, MMT CO_2e (%)	
		2035	2050
State and local	Integrate smart technologies and energy management systems into buildings, cutting residential HVAC and lighting energy demand by 10% and commercial energy demand by 16% by 2050.	1.7 (3%)	4.2 (10%)

Source: CMAP and E3, 2025.

4.3 Accelerate on-site energy generation

Distributed energy resources, such as rooftop solar and small-scale storage, are essential to decarbonize existing buildings. In addition to reducing development code barriers, governments and utilities should maintain and expand financial support to reduce installation costs, including rebates, on-bill financing, and low-interest loans. The IRA increased solar panel, solar water heater, small wind turbine, geothermal, and battery storage installations by offering substantial tax credits and rebates. The Section 25D Residential Clean Energy Credit, which offers 30 percent tax credits for clean energy systems, expired after 2025.[169] The Section 48E Clean Electricity Investment Credits and Section 45Y Clean Electricity Production Credits offer tax credits for clean energy technology installations and operations, but they have been terminated for wind and solar facilities coming into service after December 31, 2027.[170] This level of support needs to be restored and further supported by state and utility initiatives.

Programs like Solar for All demonstrate effective models, offering subsidies tied to guaranteed bill savings for income-eligible households. In Illinois, the program offset solar installation costs based on guaranteed savings on bills for income-eligible homeowners and multifamily properties.[171] While the program's status is uncertain, scaling up the funding available for such programs will be crucial in ensuring an inclusive transition.[172]
Many aging homes, especially in low-income neighborhoods, often need repairs before renewable energy systems can be installed. States and utilities need to provide grants or low-cost loans for roof work, electrical panel upgrades, and other pre-installation improvements to ensure a fair transition.

States, particularly Wisconsin, should strengthen compensation for property owners who generate renewable energy on-site. Illinois and Indiana currently reimburse generation costs, excluding delivery, transmission, and other fixed charges. Wisconsin lacks statewide net metering and leaves compensation to utility discretion. To create fair and consistent markets, states and utilities should also expand renewable energy certificate programs like Illinois Shines so that small-scale residential and commercial systems can benefit alongside utility-scale projects.[173]

Bronzeville community microgrid

The Bronzeville community microgrid in Chicago illustrates the potential for neighborhood-scale energy solutions. Funded in part by a U.S. Department of Energy grant and implemented by ComEd, the project delivers locally generated power to more than a thousand consumers.[179] Powered partly by solar panels at the Chicago Housing Authority's Dearborn Homes, it supports critical facilities including the Chicago Public Safety headquarters, schools, libraries, health clinics, and places of worship. By reducing transmission losses and providing backup during times of grid stress, Bronzeville demonstrates how community-scale microgrids can enhance reliability while advancing clean energy goals.

4.4 Develop neighborhood-scale energy solutions

Neighborhood-scale solutions, including community solar, geothermal networks, and microgrids, collectively deliver clean energy. The Illinois Shines program allows customers, particularly low-income residents, to receive credits on energy bills by subscribing to local solar energy plants. Through the recently cancelled federal program, Solar for All, income-eligible homeowners and renters receive deeper subsidies by subscribing to solar projects without installing panels themselves.[174] In Illinois, the Solar for All program continues to receive state funding through CEJA and the Illinois Commerce Commission, but similar investments are needed in Indiana and Wisconsin.[175]

Institutional and corporate campuses are already piloting geothermal networks, and these efforts could expand. Loyola University Chicago demonstrates the potential of geothermal systems. Its Institute of Environmental Sustainability and Piper Hall at its Lake Shore Campus, along with the Loyola University Chicago Retreat and Ecology Campus in Woodstock, Illinois, are powered by geothermal, reducing energy costs by 30 percent. The 22 geo-exchange wells at Piper Hall, installed in 2024, used IRA tax credits to cover 40 percent of project costs.[176]

Scaling geothermal from campuses to urban areas requires coordination across multiple property owners. A public or third-party entity could finance and operate networked systems and provide thermal service to consumers at a community level. New provisions in Illinois' Clean and Reliable Grid Act create a state-backed loan program to fund thermal energy network pilots and, for the first time, make geothermal systems eligible for renewable energy incentives.[177] These changes position Illinois to accelerate deployment of district-scale heating and cooling networks that use geothermal and waste-heat recovery systems to reduce energy demand and emissions.

In Chicago, a coalition led by Blacks in Green is demonstrating this approach through a $9.9 million U.S. Department of Energy grant to deploy a networked geothermal system in the West Woodlawn neighborhood. This project will provide clean, affordable heating and cooling to over 200 homes.[178] Utilities are also piloting microgrids to improve energy resilience and supply flexibility. Microgrids integrate distributed energy resources, like wind turbines, rooftop solar, and battery storage, to reliably supply clean power while reducing peak demand. Customers benefit from lower bills, and utilities can allow fossil-fueled power plants to remain offline, avoiding costly investments in new power plants to meet rising peak demand.

Objective 5: Increase use of low-carbon materials

Reducing embodied carbon in buildings requires both reusing and repurposing existing structures and shifting to low-carbon materials in new construction. Retrofitting and adaptive reuse minimize the carbon-intensive impacts of demolition and rebuilding. Selecting alternative materials, such as mass timber, recycled steel, and other carbon-sequestering or locally sourced products, reduces lifecycle emissions when new construction is necessary.

State and local governments can do a lot to accelerate adoption. They can update building codes and standards to require or incentivize low-carbon materials, adopt Buy Clean policies that establish embodied carbon limits for publicly funded projects, mandate the use of environmental product declarations in public procurements to increase transparency, and fund pilot projects that showcase innovative products (see the waste chapter for more details). Providing curated lists of regional low-carbon suppliers or product certification lists can also help builders and consumers make informed choices, ensuring that embodied carbon reductions become a standard part of construction practices.[180]

07

Transportation

About this chapter

This chapter outlines transportation's role in achieving the region's reduction targets, including current conditions, modeled scenarios, and key objectives and strategies. It shows how coordinated action across state, local, federal, and private partners can deliver a 92 percent reduction in transportation emissions by 2050, with select measures quantified to show the scale and pace of change required.

Transportation objectives and strategies

1. Electrify vehicles

- 1.1. Accelerate the adoption of passenger EVs
- 1.2. Accelerate the adoption of zero-emission freight trucks
- 1.3. Transition public agency fleets to EVs
- 1.4. Expand access to charging infrastructure for on-road vehicles
- 1.5. Electrify off-road engines, including lawn and landscaping equipment
- 1.6. Integrate onshore power at regional ports

2. Increase fuel efficiency and the adoption of low carbon fuels

- 2.1. Expand low-carbon fuel use
- 2.2. Increase the production of sustainable aviation fuel

3. Move people and goods efficiently

- 3.1. Implement road pricing
- 3.2. Increase transit ridership
- 3.3. Increase active transportation
- 3.4. Deploy intelligent transportation system technologies and other operations
- 3.5. Improve supply chain management and freight efficiency

Decarbonizing the region's transportation sector is essential to meeting climate goals, improving air quality, and creating a more efficient and fairer system. To make deep reductions in transportation emissions, Greater Chicago must electrify vehicles across all modes, expand the use of low-carbon fuels, and reduce vehicle miles traveled (VMT) through compact land use, accessible transit, and active transportation options. These actions will not only cut GHG emissions but also enhance public health, increase access to opportunity, and strengthen the region's economy.

Cars and trucks dominate transportation emissions

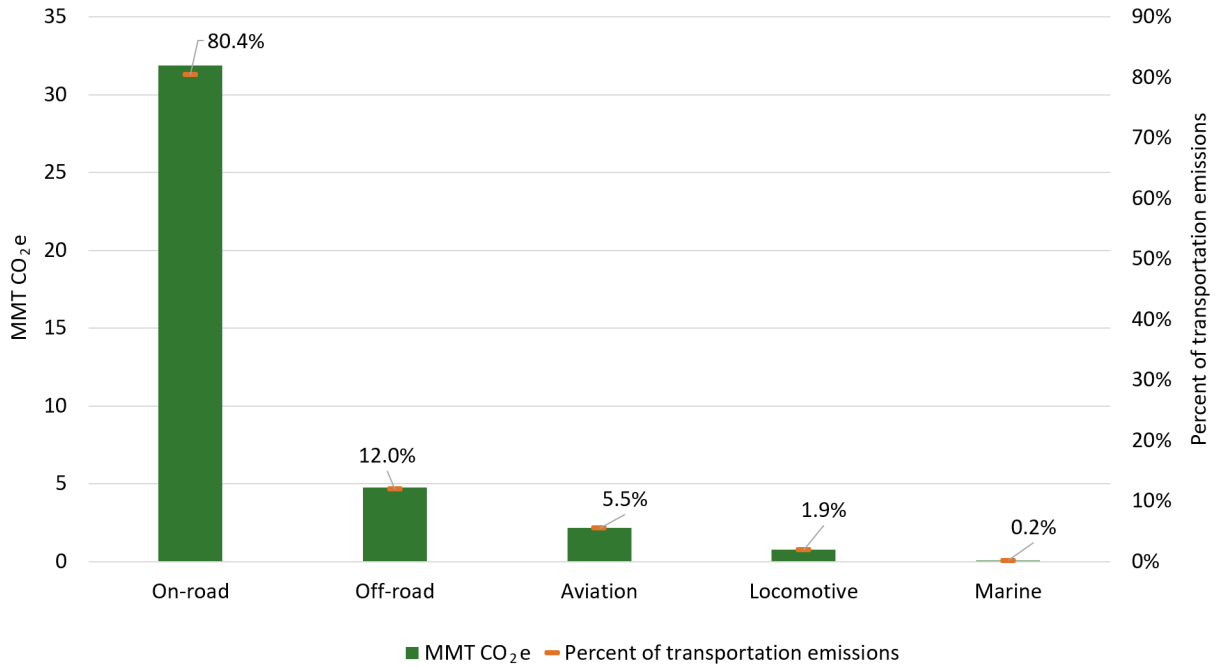
Transportation is responsible for 26 percent of the region's total emissions, or 40 MMT CO_2e annually. Between 2005 and 2020, transportation emissions decreased 29 percent, driven primarily by dramatic improvements in vehicle fuel efficiency, following the Energy Independence and Security Act of 2007 and the introduction of federal GHG emissions standards through the Clean Air Act (2009).

On-road vehicles, primarily cars and trucks, produce about 80 percent of transportation emissions, followed by off-road equipment, aviation, locomotives, and marine vessels (Figure 24). Within on-road sources, passenger vehicles account for nearly 70 percent of emissions (Figure 25). Despite gains in fuel economy and emissions rates, passenger vehicles continue to produce most on-road emissions due to the sheer volume of VMT across the region.

Vehicle size and freight activity offset efficiency gains

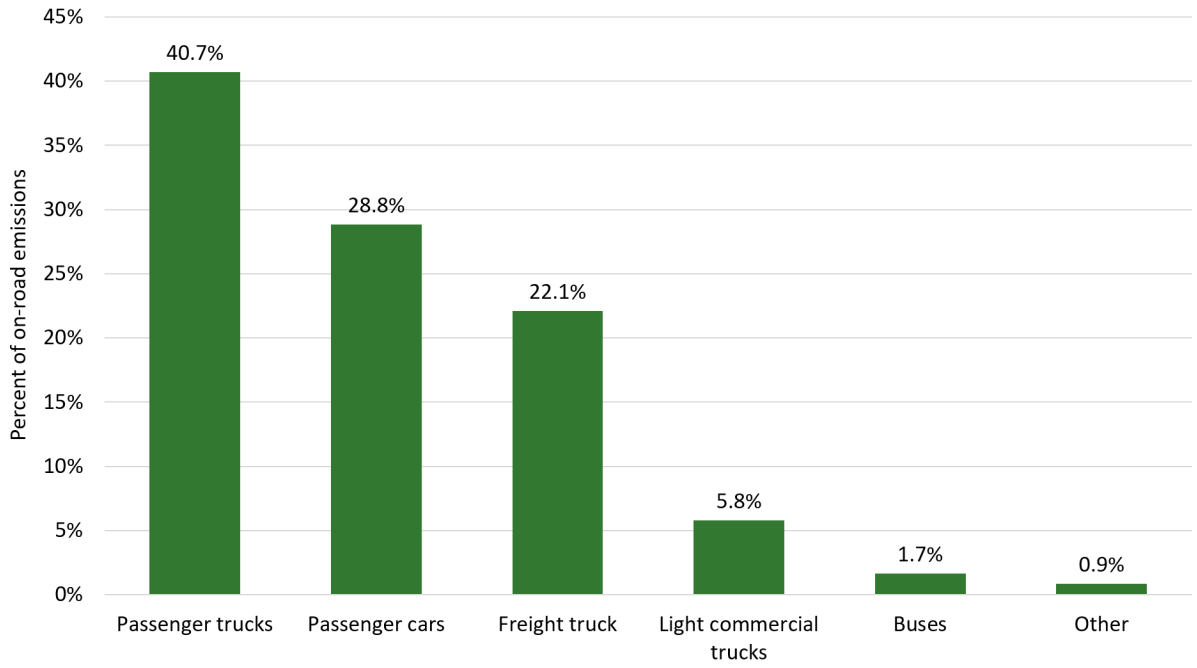
Passenger trucks, including SUVs and pickup trucks, now make up an increasing share of new vehicles and contribute roughly 40 percent of on-road emissions, offsetting some of the progress from efficiency improvements. Freight and commercial trucks represent a smaller share of total travel, but account for nearly 30 percent of on-road GHG emissions due to their high energy use and reliance on diesel.

Figure 24. Transportation greenhouse gas emissions by subsector, 2020



Source: CMAP 2020 GHG Inventory, 2024.

Figure 25. On-road emissions by vehicle type



Source: CMAP 2020 GHG Inventory, 2024.

Land use and travel patterns shape emissions

Transportation emissions reflect a complex interaction of land use, infrastructure, technology, and behavior. Dispersed development patterns and auto-oriented infrastructure lengthen trips and increase reliance on personal vehicles. Travel costs — including fuel prices, vehicle ownership, and travel time — shape travel choices, while extreme weather events can disrupt mobility and damage infrastructure, increasing congestion and emissions. At the same time, electrification, alternative fuels, and efficiency improvements offer powerful tools for emissions reduction, depending on the speed and scale of adoption. As a major freight hub, Greater Chicago faces unique challenges in managing freight growth without increasing emissions.

Transportation burdens community health

The transportation system imposes significant public health and community impacts. Vehicles and heavy equipment powered by gasoline and diesel fuels emit particulate matter, nitrogen oxides, and volatile organic compounds that contribute to asthma, cardiovascular disease, and premature death. Communities near highways, airports, ports, and freight hubs face disproportionate exposure.[181] At the same time, many residents lack access to safe, affordable alternatives to driving. Investments in transit, walking, and bicycling infrastructure can reduce pollution, improve safety, and expand access to jobs, services, and daily needs.

Coordinated investment will determine success

Despite these challenges, the region is well positioned to accelerate progress. Greater Chicago's extensive, multimodal transportation system, supported by experienced public agencies, transit providers, freight and logistics operators, and other private-sector partners, provides a strong foundation for decarbonization. However, success will depend on sustained investment in transit and active transportation, rapid deployment of clean technologies, and coordinated policy across jurisdictions. Shifting travel behavior, managing freight demand, and aligning land use with transportation investments will be critical to achieving a resilient, low-carbon transportation future.

Reaching the 2050 target

The transportation sector must reduce emissions by 92 percent below 2005 levels by 2050 to align with regional climate goals. Achieving this transformation requires accelerating the shift to zero-emission vehicles across all modes, expanding low-carbon fuels for aviation and freight, and reducing VMT through more efficient land use and transportation investments. By building on the region's extensive multimodal network, established transit systems, and strong public-private partnerships, Greater Chicago can deliver deep emissions reductions while improving air quality, expanding access to jobs, and strengthening the regional economy.

Current policy scenario

If no new policies are adopted, transportation emissions are still projected to drop by 53 percent below 2005 levels by 2050 (Figure 26), driven largely by modest growth in electric vehicle adoption and continued efficiency gains in gasoline-powered vehicles. But those gains are limited as incentives dissipate and efficiency standards level off. While significant, this reduction falls short of what is needed, particularly as incentives expire and fuel economy standards plateau.

Plan implementation scenario

This scenario reflects modeled reductions from 12 of the 14 strategies, resulting in substantial declines in both passenger and freight vehicle emissions (Figure 26).[182] Vehicle electrification delivers the largest reductions over time, leading a nearly fully electric on-road fleet by 2050. Because the transition to electric vehicles will take time, fuel efficiency improvements and low-carbon fuels — particularly for harder-to-electrify vehicles — provide a critical near-term bridge. Strategies that reduce VMT and improve system efficiency contribute meaningful emissions reductions while also enhancing mobility, accessibility, and quality of life.

Together, these strategies enable the plan implementation scenario to achieve the 92 percent reduction target, based on three objectives:

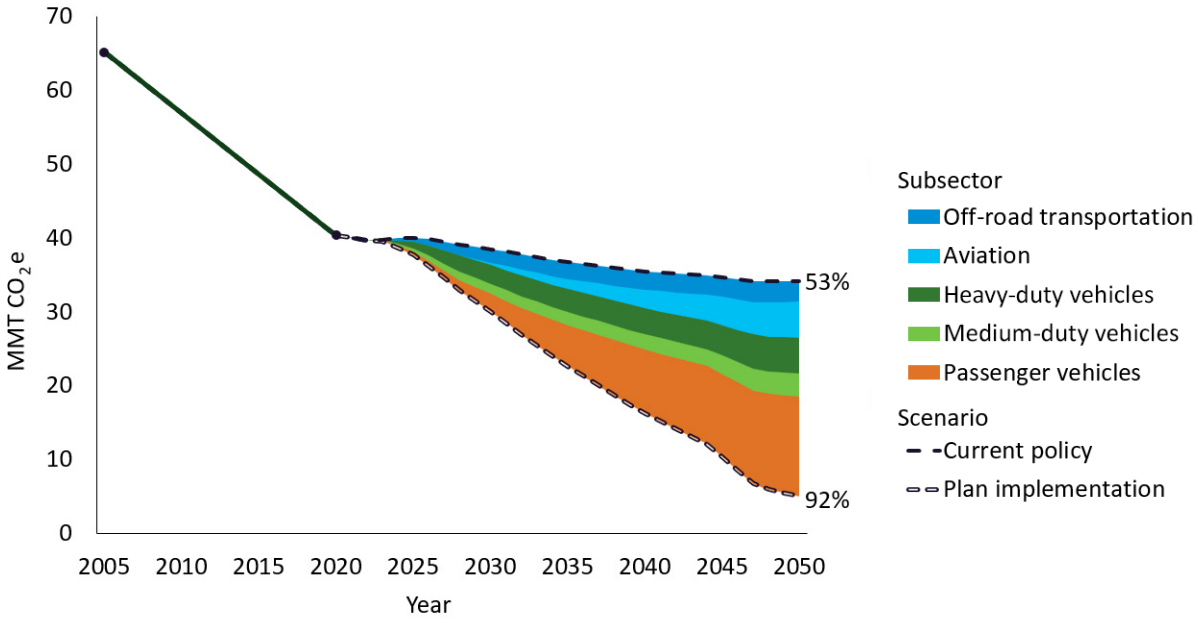
1. Electrify vehicles.
2. Increase fuel efficiency and the adoption of low carbon fuels.
3. Move people and goods efficiently.

Achieving the full reduction target depends on enhanced federal action, including electric vehicle sales mandates for passenger and medium- and heavy-duty vehicles, and expanded deployment of sustainable aviation fuel, complemented by sustained state and local investment.

State and local role

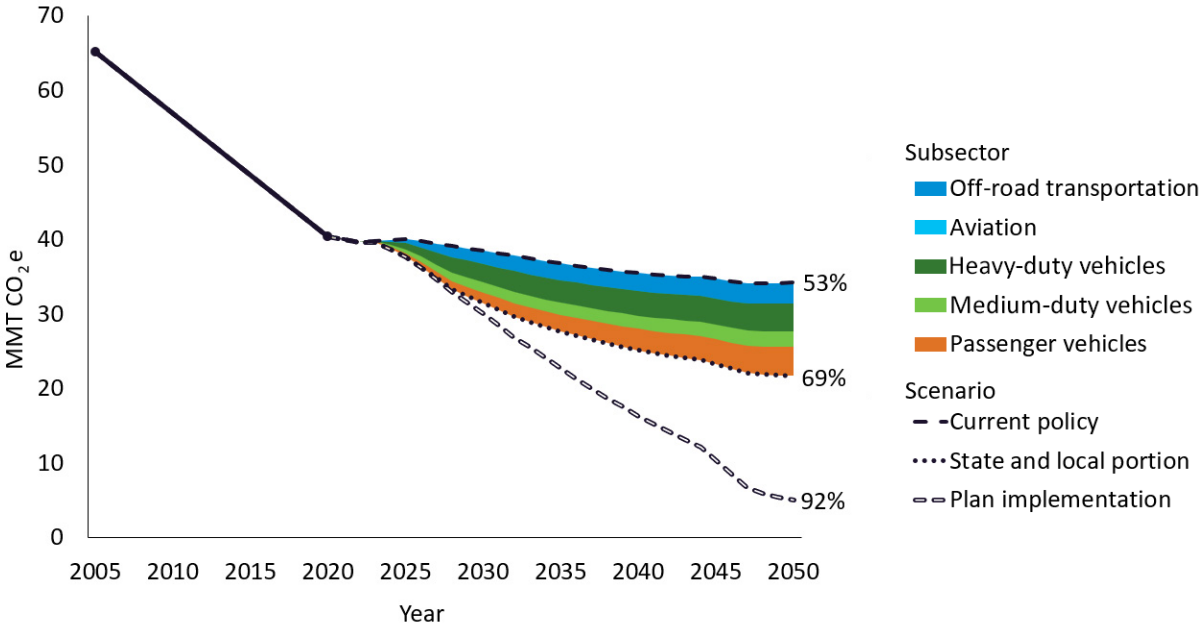
Actions led by state and local governments account for nearly 70 percent of the reductions needed by 2050. While federal partnership is key in transforming the fleet, state and local policy, including investments in transit and active transportation, land use decisions that promote shorter trips and active modes, and pricing mechanisms that encourage more efficient travel, are essential (Figure 27). This underscores the region's pivotal role in shaping how people and goods move.

Figure 26. Transportation emissions reductions by subsector under the plan implementation scenario, MMT CO_2e (2005-2050)



Source: CMAP and E3, 2025.

Figure 27. Transportation emissions reductions by subsector for the state and local implementation scenario, MMT CO_2e (2005-2050)



Source: CMAP and E3, 2025.

The following objectives and strategies outline specific actions needed by the federal, state, and local governments, transit agencies, utilities, and private sector partners to deliver these reductions. Details on modeled strategies are provided in Appendix D.

Objective 1: Electrify vehicles

The region must accelerate the transition to electric vehicles, the most effective way to reduce emissions from vehicle travel. EVs eliminate tailpipe emissions by replacing internal combustion engines with electric motors.[183] Because most transportation emissions come from on-road vehicles, electrifying cars, trucks, and buses is critical. Achieving the region's target requires electrification across all transportation subsectors and coordinated strategies to accelerate EV adoption.

EVs deliver the greatest climate benefit when paired with a clean electric grid. Complementary strategies — like expanded transit and active transportation — can further reduce emissions and help manage growing electricity demand from vehicle charging.

1.1 Accelerate the adoption of passenger EVs

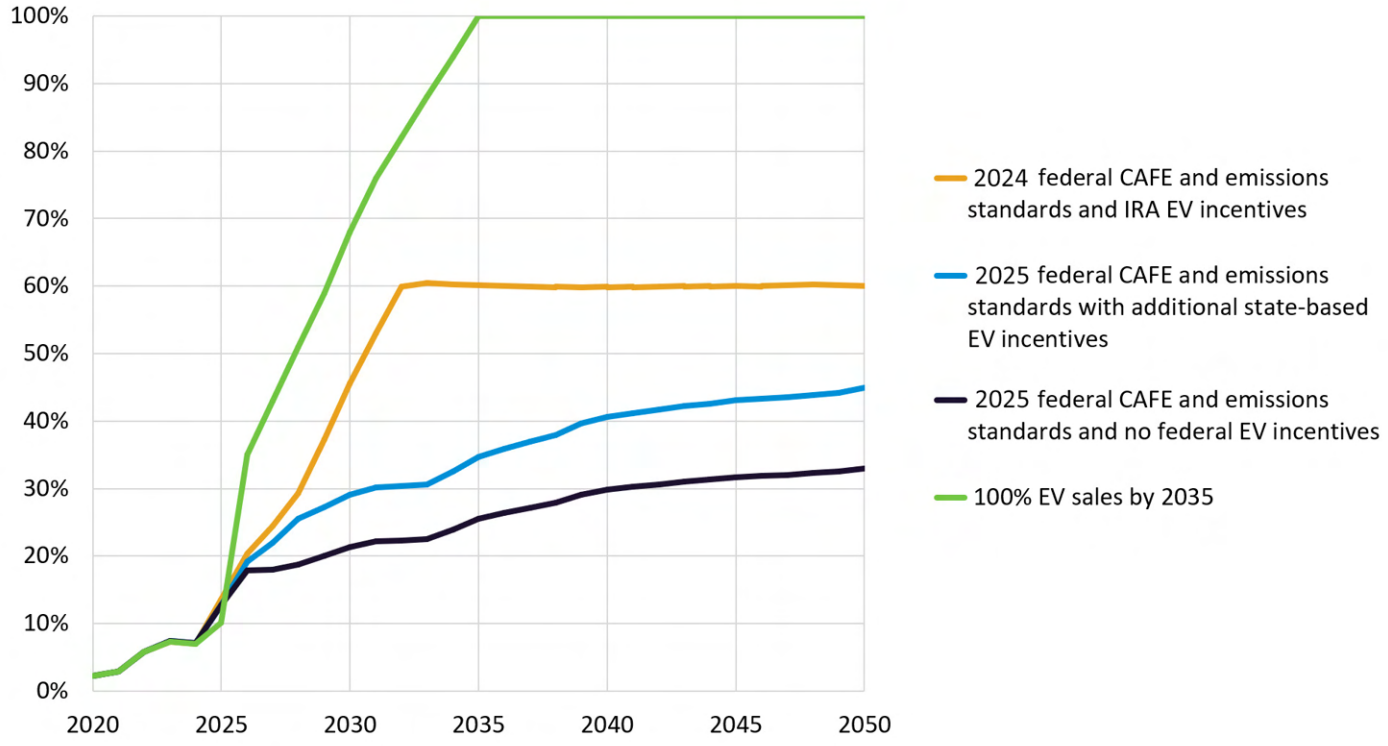
To meet the region's transportation emissions target, 100 percent of new light-duty vehicle sales must be electric by 2035. The 2024 CAFE standards modestly raised fleetwide averages to 65 miles per gallon for passenger cars and 45 for light trucks by 2031. Subsequent actions in 2025 suspended enforcement penalties and proposed rescinding the USEPA's endangerment finding, effectively nullifying the standards' climate impact and creating new uncertainty about the pace of this transition.

Figure 28 illustrates how these changes alter the region's projected EV adoption. Under past federal policies and incentives, EVs could have achieved about 60 percent of new sales by 2032; under current rollbacks, this drops to roughly 24 percent. Strong federal standards or mandates as well as incentives are needed to reach 100 percent of new sales by 2035. In the absence of federal action, states can play a pivotal role.

Federal standards and their impact

The U.S. Department of Transportation (USDOT) and USEPA regulate vehicle efficiency and emissions through two complementary frameworks. Corporate Average Fuel Economy (CAFE) standards, set by USDOT's National Highway Traffic Safety Administration, require automakers to improve the average fuel economy of their fleets, measured in miles per gallon. GHG emissions standards, set by USEPA under the Clean Air Act, limit the amount of carbon pollution emitted by new vehicles. Together, these standards shape automakers' technology choices and indirectly influence the share of zero-emissions vehicles sold.

Figure 28. Light-duty electric vehicle sales share in Greater Chicago under different policy scenarios



Source: E3, 2025.

Advance EV sales requirements for passenger vehicles

Federal standards should be updated to effectively increase the share of EVs annually, reaching 100 percent of new light-duty vehicle sales by 2035. By 2050, cumulative sales need to exceed 10 million battery electric light-duty vehicles and over 1 million plug-in hybrid light-duty vehicles, assuming no major change in vehicle ownership trends. This level of adoption would reduce transportation emissions by 36 percent by 2050 relative to the current policy scenario. Because vehicles remain on the road for many years, the resulting light-duty fleet in 2050 would be composed of roughly 88 percent battery-electric, 6 percent plug-in hybrids, and 6 percent gasoline-powered — a transformative shift in just 25 years (Table 25).

If updates to federal standards are not immediately feasible, federal action should, at a minimum, restore and protect states' authority to adopt more stringent vehicle standards. Congress granted California this authority under the 1967 Clean Air Act, allowing it to set its own vehicle emissions standards. California's Advanced Clean Cars II (ACC II) program requires increasing shares of zero-emissions vehicles (ZEVs) through 2035 and has since been adopted by 12 other states through Clean Air Act waivers that permit adherence to California's stricter rules.[184] Although slightly less ambitious than what is required to meet regional targets, state adoption of ACC II standards would significantly accelerate the transition from gasoline and diesel vehicles, drive down emissions, expand EV markets, and lower costs for consumers.[185] In 2025, Congress rejected these waivers for the first time under the Congressional Review Act, effectively invalidating ACC II and Advanced Clean Trucks until ongoing legal challenges are resolved.

Provide EV incentives

Financial incentives are critical to complement EV sales mandates and ensure access. Rebates and tax credits lower upfront costs, support fleet turnover, and strengthen EV markets — creating the demand stability that encourages manufacturers to expand production. The IRA created incentives for new and used EV purchases, commercial leases, and home or business charging installations.[186] Although these programs expired in September 2025, reinstatement or equivalent state programs are needed to maintain market momentum.

Modeling suggests that statewide EV incentives comparable to prior federal credits could reduce regional transportation emissions by 5 percent by 2050 relative to the current policy scenario (Table 25). This scenario assumes an average $4,300 rebate for new vehicle purchases, similar to the former IRA credit. To ensure fairness and maximize co-benefits, incentives should prioritize low-income residents. The Illinois EPA Electric Vehicle Rebate Program has already provided more than 11,000 rebates of $4,000 each, prioritizing applications received from low-income purchasers.[187]

Table 25. Electric vehicle sales requirements and incentives

Scenario	Modeled strategy	GHG emissions reduced, MMT CO_2e (% of sector emissions)	
		2035	2050
Plan implementation	Require 100% of new light-duty vehicles sold by 2035 to be EVs.	3.7 (10%)	12.2 (36%)
State and local	Establish state and local incentives to sustain EV purchases and charging infrastructure adoption levels after the expiration of IRA incentives.	0.5 (2%)	1.8 (5%)

Source: CMAP and E3, 2025.

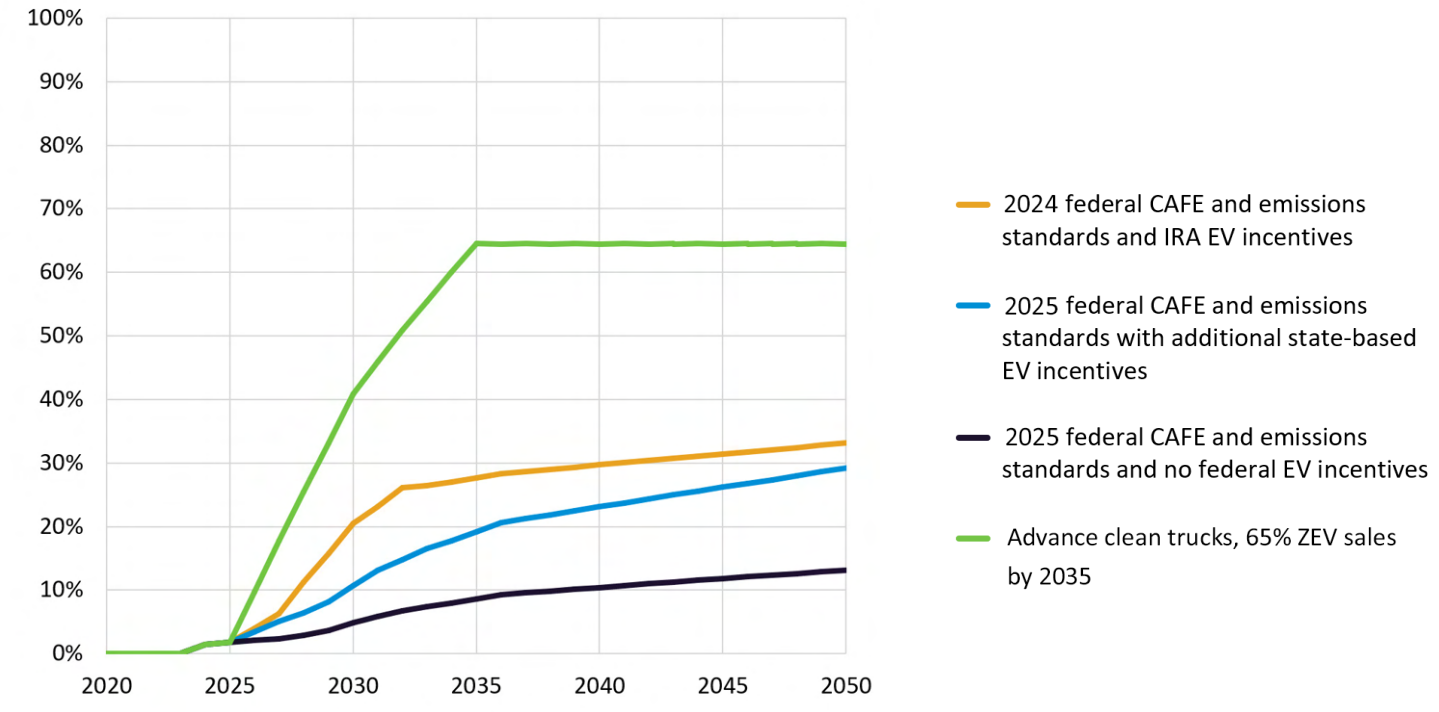
1.2 Accelerate the adoption of zero-emission freight trucks

Freight is the backbone of the regional economy — but also one of its largest and most geographically concentrated sources of emissions. Medium- and heavy-duty vehicles contribute a disproportionate share of GHG and criteria air pollutant emissions, particularly in communities near highways, intermodal yards, ports, and warehouse clusters. Transitioning freight fleets to zero-emission vehicles is essential to reduce emissions and improve health outcomes.

To meet regional targets, modeling indicates that all new medium- and heavy-duty vehicle sales must be zero-emission vehicles by 2040, including 96 percent battery-electric and 4 percent fuel cell. As with passenger EVs, recent federal policy has slowed national progress and introduced uncertainty for this transition. Under previous federal incentives, ZEVs could have achieved about 26 percent of new sales by 2032; under current policies, that share falls to roughly 7 percent (Figure 29).

Achieving the necessary pace of freight electrification requires three coordinated actions: strong zero-emission sales requirements, sustained financial incentives, and indirect source rules that limit freight-related pollution at its source. Electrifying medium- and heavy-duty fleets presents unique challenges, including limited model availability across weight classes, the need for coordinated routing and charging schedules, and high-power demand. Large-scale deployment requires coordination with utilities and grid operators to ensure that charging infrastructure and grid capacity keep pace. Addressing these challenges requires targeted investment, strong policy direction, and collaboration among manufacturers, utilities, fleet operators, and public agencies.

Figure 29. Medium- and heavy-duty zero-emission vehicle sales share in Greater Chicago



Source: E3, 2025.

Advance ZEV sales requirements for freight trucks

Federal standards should require manufacturers to sell an increasing share of ZEVs each year, reaching 100 percent of new medium- and heavy-duty vehicle sales by 2040, with 96 percent battery electric and 4 percent fuel cell. This would reduce transportation emissions by 17 percent by 2050 relative to the current policy scenario (Table 26). If federal updates are not feasible, Congress should restore states' authority to adopt Advanced Clean Trucks — a policy parallel to ACC II for passenger vehicles — that requires increasing annual ZEV sales by vehicle class.[188] Eleven states have adopted Advanced Clean Trucks-style mandates as of April 2025.[189] These ambitious sales targets align with multi-state medium- and heavy-duty vehicle electrification initiatives.[190]

Table 26. Zero-emissions vehicle sales requirements and incentives

Scenario	Modeled strategy	GHG emissions reduced, MMT CO_2e (% of sector emissions)	
		2035	2050
Plan implementation	Require manufacturers to sell an increasing share of zero-emissions medium- and heavy-duty vehicles, reaching 100% of sales by 2040.	0.8 (2%)	5.7 (17%)
State and local	Establish state and local incentives to sustain EV purchases and charging infrastructure adoption levels after the expiration of IRA incentives.	0.1 (0.3%)	0.8 (2.3%)

Source: CMAP and E3, 2025.

Provide truck ZEV incentives

As with passenger EVs, financial incentives are essential to overcoming high upfront costs and creating demand stability for manufacturers. The IRA created commercial ZEV tax credits worth up to $7,500 for vehicles less than 14,000 pounds and up to $40,000 for vehicles more than 14,000 pounds.[191] Although these federal incentives expired in September 2025, federal- or state-level programs can help to both sustain market growth and reduce emissions.[192]

Several states are already demonstrating this approach. The Driving a Cleaner Illinois program distributes funding for zero-emission truck replacements.[193] In September 2025, the Illinois EPA announced up to $18 million in funding to replace existing diesel freight and port drayage trucks with electric versions.[194]

Adopt indirect source rules for warehouse operators

States and regions can reduce emissions by regulating freight activity at major logistics hubs. Indirect source rules, authorized under the Clean Air Act, require warehouse and distribution operators to mitigate emissions generated by truck traffic to and from their sites. For example, the South Coast Air Quality Management District in California requires warehouse operators to "earn points" based on their truck activity, with compliance achieved through actions such as purchasing electric trucks, installing on-site charging and refueling infrastructure, or investing in battery storage systems.[195] Similar regional programs could accelerate private-sector investment in zero-emission technologies and create benefits for nearby communities.

1.3 Transition public agency fleets to EVs

Public agencies can lead this strategy by proactively transitioning their vehicle fleets. Transit agencies, school districts, and state and local governments operate thousands of vehicles across the region, representing a significant opportunity to reduce emissions and build public confidence in EVs. Fleet electrification is a critical component of the overall push to electrify the transportation sector, meet regional emissions reduction targets, improve air quality, and reduce exposure to harmful pollutants for workers, transit riders, and students traveling on school buses.

Successful transitions require coordination with utilities to ensure adequate power supply and charging capacity. Utilities and nonprofit organizations can support agencies, especially smaller ones, by conducting fleet assessments that identify vehicle replacement schedules, charging infrastructure needs, and grid impacts.[196]


Source: Village of Skokie.

EV charging ports and municipal fleet at Skokie Village Hall

As part of its ongoing commitment to environmental sustainability, the Village of Skokie recently installed and activated 13 new Level 2 EV charging ports at its village hall. The project was completed in partnership with ComEd through its Beneficial Electrification Make-Ready Rebate program. ComEd provided essential utility infrastructure — including a transformer, pole, and meter — at no cost to the village. The new ports support the village's expanding fleet of EVs and increase its fleet charging capacity by more than 50 percent.

Transit bus fleets: Regional transit agencies must have zero-emission bus fleets by 2040, consistent with commitments made by the Chicago Transit Authority (CTA) and Pace. To stay on track, all new bus purchases should be zero-emission vehicles starting in 2026 (Table 27). The region is already making progress, with CTA, Pace, and the Gary Public Transit Authority investing in electric buses and charging facilities.[197]

However, national market conditions have made battery-electric buses more costly and difficult to procure, and agencies continue to balance electrification with competing state-of-good-repair needs. Dedicated funding streams, procurement innovation, and recovery of the battery-electric bus market are necessary to maintain progress toward zero-emission fleet goals without compromising service reliability and mode-shift investments.

Transit buses account for less than one percent of on-road emissions, so agencies should continue to prioritize high-quality, frequent service — which delivers far greater emissions benefits through increased ridership — while advancing fleet electrification as funding and technology improve.

School bus fleets: Schools should transition to all-electric school bus fleets by 2035.[198] Their large batteries can also support the power grid by storing energy for use during peak periods or emergencies. School buses have been more aggressively electrified than other fleets, aided by funds from the Volkswagen settlement.[199] ComEd's vehicle-to-grid pilot program is currently testing the potential of electric school buses to strengthen grid resilience in the region.[200]

Source Drive Clean Indiana.

The School Town of Munster in northwest Indiana welcomed its first Blue Bird all-electric school bus in June 2020, advancing its initiative to transition to clean student transportation.

State, county, and local fleets: Government fleets should aim for full electrification by 2035, aligning with the City of Chicago's zero-emission fleet commitment.[201] Achieving this requires that all new vehicle purchases be zero-emission starting immediately, with some early retirements likely needed. Fleets range from light-duty vehicles to refuse trucks, snowplows, and police vehicles, requiring planning, utility coordination, and charging infrastructure investment. Programs like the Metropolitan Mayors Caucus' EV Readiness Program provide critical education and support to encourage these transitions.[202]

One of the City of Chicago's Streets and Sanitation all-electric refuse trucks.

Table 27. Electrify public agency fleets

Scenario	Modeled strategy	GHG emissions reduced, MMT CO_2e (% of sector emissions)	
		2035	2050
State and local	Require all school buses to be electric by 2035, and all transit buses to be electric by 2040.	0.05 (0.1%)	0.07 (0.2%)
State and local	Require all public fleet vehicle purchases to be zero-emission vehicles, starting in 2026.	0.02 (0.1%)	0.1 (0.2%)

Source: CMAP and E3, 2025.

1.4 Expand access to charging infrastructure for on-road vehicles

Accelerating EV adoption requires widespread charging infrastructure for residents and public and private fleets. Charging access has grown exponentially in the last 10 years, allowing drivers to rely on EVs for both daily and intercity travel. Continued investments are needed along expressways and major routes, and at new and existing developments, commercial and industrial freight hubs, and curbside locations.

Federal, state, and local agencies should collaborate to expand the regional charging network, prioritizing publicly accessible, government-owned sites — such as park district facilities, forest preserve lots, and municipal parking areas — that can serve as both public amenities and modest revenue sources. Integrating solar-powered charging stations at these sites would further advance clean energy adoption and demonstrate regional leadership in electrification.

Since 2022, the Metropolitan Mayors Caucus' EV Readiness Program has helped 38 communities become EV Ready by providing technical assistance and training to meet the rising demand for EVs and charging infrastructure. Programs that build local capacity and address zoning and permitting barriers are key to accelerating deployment.

Expanding access for residents of multi-unit dwellings is especially critical due to limited dedicated parking for chargers and the higher cost of fast charging compared to home charging overnight. It is also essential to standardize technical requirements for charging infrastructure so public EV chargers can consistently serve as many types of EVs as possible. Financial tools such as grants, loans, and tax incentives can speed deployment, while energy incentives encouraging off-peak charging help manage demand. To enable a smooth transition, all newly constructed residential parking must be EV-capable, including the electrical capacity and conduit needed to support future installation of chargers, in alignment with the EV Charging Act in Illinois (765 ILCS 1085). Municipal zoning and development ordinances must be updated accordingly, with coordination from utilities to ensure adequate power supply, particularly for large fleets.

Zero-emission freight trucks will also require dedicated charging infrastructure to accelerate their adoption. Federal, state, and local agencies should proactively plan for freight-specific needs — such as high-capacity charging, vehicle staging, and onshore power at ports and freight hubs. Targeted incentives, such as reduced tolls or permit fees for zero-emission trucks, along with investments in ports, rail yards, and multimodal hubs, can help drive industry transition and attract private investment.

1.5 Electrify off-road engines, including lawn and landscaping equipment

Businesses in agriculture, construction, and industrial sectors should transition to electric vehicles and equipment — tractors, combine harvesters, excavators, bulldozers, forklifts, and terminal tractors — to reduce off-road emissions. States should require all new off-road engines to be zero-emission and provide incentives to support early adoption. In northeastern Illinois, for example, Metra received funds through the Congestion Mitigation and Air Quality Improvement Program to replace diesel locomotives with electric trainsets and switchers. Greater Chicago needs similar financial incentives to electrify off-road vehicles across sectors.

Similarly, states should mandate zero-emission lawn and landscaping equipment, mirroring California's small off-road engine regulations. Implementing these rules by 2035 would reduce sector emissions by 1 percent by 2050 relative to the current policy scenario (Table 28) — a modest reduction overall but a significant 37 percent decrease in regional off-road gasoline demand. Electrifying lawn and landscaping equipment also delivers immediate air quality improvements, especially for workers in the landscaping industry.

To support smaller businesses, states should fund incentives for equipment like lawnmowers, trimmers, and leaf blowers, which are already commercially available. Through buyback programs, older gasoline- and diesel-powered equipment can be retired, responsibly recycled, and replaced with new zero-emission equipment. Local governments can learn from existing regional efforts, such as the Regional Leaf Blower Working Group, a working group of 12 municipalities and landscape industry representatives who worked together to identify targeted solutions to advance equipment electrification.[203]

Source: Metra.

Metra's electric locomotives and trainsets

Metra will purchase 16 battery-powered trainsets and 3 electric switch locomotives with funding from the Congestion Mitigation and Air Quality Improvement Program and the Rebuild Illinois capital program. Battery-powered trainsets are zero-emissions, cleaner, quieter, and more operationally efficient. The first set is expected to be introduced on the Beverly Branch of the Rock Island Line, providing immediate air quality benefits in an area disproportionately impacted by pollution. Metra plans to deploy the trainsets to other rail lines as well. Similarly, Metra's three new electric switch locomotives will replace some of the oldest, highest-polluting diesel engines in the rolling stock, to be deployed at rail yards in communities in the region experiencing high rates of pollution. Together, these investments will reduce locomotive GHG emissions, improve air quality, and modernize the region's commuter rail system.

Table 28. Electrify lawn and landscaping equipment

Scenario	Modeled strategy	GHG emissions reduced, MMT CO_2e (% of sector emissions)	
		2035	2050
State and local	Require all lawn and landscaping equipment to be zero emissions by 2035.	0.3 (0.8%)	0.4 (1%)

Source: CMAP and E3, 2025.

1.6 Integrate onshore power at regional ports

The region's public ports — Waukegan, Joliet, the Illinois International Port District, and Indiana's Burns Harbor — play a critical but often underrecognized role in supporting freight movement and regional competitiveness. Onshore power, which allows vessels to shut off diesel engines and connect to the grid while docked, can reduce GHG emissions and local air pollution.[204]

States should work with public ports to require large vessels to use onshore power while docked, similar to California's Ocean-going Vessels At Berth regulation (Table 29).[205] California's regulation has already expanded onshore power at six different ports, and similar rules could do the same in Greater Chicago.[206] To support implementation, ports will need investment in shore power infrastructure, on-site renewable energy generation, and grid upgrades. Through the Clean Ports Program, Illinois EPA is already working with partners to electrify port operations throughout the region.[207]

Beyond emissions reductions, expanding waterborne freight presents an opportunity to move more goods by the most energy-efficient and lowest-emission mode of transport. The region's connections to the Mississippi River and the St. Lawrence Seaway position Greater Chicago to capture economic and environmental benefits by shifting freight from road to water. Increasing awareness among shippers, farmers, and manufacturers of these multimodal advantages can help strengthen supply chain resilience while supporting the region's clean energy and economic development goals.

Table 29. Require shore power for marine vessels

Scenario	Modeled strategy	GHG emissions reduced, MMT CO_2e (% of sector emissions)	
		2035	2050
State and local	Require all large vessels to use shore power or equivalent emission controls by 2030.	0.002 (0%)	0.016 (0.05%)

Source: CMAP and E3, 2025.

Objective 2: Increase fuel efficiency and the adoption of low-carbon fuels

Fuel efficiency standards have encouraged manufacturers to design vehicles that travel farther on the same amount of fuel, while emissions standards limit the GHG output from conventional vehicles. More recently, these standards also aimed to accelerate EV adoption (see Strategy 1.1 for more details). Although this plan emphasizes a large-scale EV transition, internal combustion engine vehicles will remain in use for some time, making improved fuel and vehicle efficiency an important interim strategy.

For hard-to-electrify vehicles, such as long-haul trucks, large off-road equipment, and airplanes, low-carbon fuels like renewable diesel and biodiesel can significantly reduce GHG emissions. As electrification and other advanced decarbonization technologies become more viable across these sectors, fleets can adopt them to achieve further emissions reduction.

2.1 Expand low-carbon fuel use

States should adopt policies that reduce the carbon intensity of transportation fuels, targeting both on-road and off-road sectors. Adopting low carbon fuel standards — requiring a 20 percent reduction in fuel emissions intensity by 2034 — could reduce regional sector emissions by 21 percent by 2050 relative to the current policy scenario (Table 30). Carbon intensity reduction requirements would need to begin in 2026 and gradually ramp up to achieve a 20 percent reduced emissions intensity requirement by 2034. States can achieve compliance producing or blending lower-carbon fuels, or via credits accrued through investments in EV or transit, as seen

in California and Washington.[208] To prevent unintended consequences, such as land use impacts or slowed electrification, these programs should include strong environmental protections and focus on the vehicles that are the hardest to electrify.

States should require off-road vehicle fleets, including construction, manufacturing, and locomotive fleets, to transition to 100 percent renewable diesel use where electrification is not feasible. By 2050, off-road vehicles are estimated to account for roughly 25 percent of diesel consumption across the transportation sector.[209] Renewable diesel — produced from soybean, canola, or other oils — has a significantly lower carbon intensity than traditional diesel and can be used with existing engines and infrastructure without requiring blending with petroleum diesel.[210]

In Illinois, many public and private fleets already use biodiesel, a related but distinct fuel that relies on similar feedstocks but must be blended with petroleum diesel and has a higher carbon intensity than renewable diesel. This widespread biodiesel use — by agencies and companies such as Ozinga, Middle River, the Lake County Division of Transportation, the City of Elmhurst, and the Forest Preserves District of DuPage County — demonstrates strong fleet familiarity with low-carbon liquid fuels and indicates substantial potential demand for renewable diesel as supply expands.[211] Expanding state incentives, such as Illinois' tax exemptions and similar programs in Wisconsin and Indiana, focused on renewable diesel production will accelerate adoption.[212]

Table 30. Adopt a low-carbon fuel standard and renewable diesel requirements

Scenario	Modeled strategy	GHG emissions reduced, MMT CO_2e (% of sector emissions)	
		2035	2050
State and local	Set a carbon intensity target for on-road transportation fuels requiring a 20% reduction by 2034 through renewable diesel blending.	6.2 (17%)	7.3 (21%)
State and local	Require 100% renewable diesel use for off-road vehicle fleets, beginning in 2027.	3.2 (9%)	3.3 (10%)

Source: CMAP and E3, 2025.

2.2 Increase the production of sustainable aviation fuel

Federal agencies should continue to support research, development, and deployment of sustainable aviation fuel. Sustainable aviation fuel has lower emissions intensity than traditional jet fuel. It can be used with existing engines and infrastructure, making it the only currently viable strategy for long-haul and heavy flights where electrification is not yet feasible.[213] However, large-scale deployment faces significant technical and economic hurdles, and its ultimate success is not guaranteed.

The U.S. agriculture, energy, and transportation departments launched the Sustainable Aviation Fuel Grand Challenge in 2021, aiming for 3 billion gallons of domestic sustainable fuel by 2030 and 35 billion gallons to meet full domestic demand by 2050.[214] Achieving these targets requires public and private investment, research, infrastructure development, and workforce expansion.

Regional adoption of sustainable aviation fuel could reduce transportation emissions by 14 percent by 2050 relative to the current policy scenario (Table 31). To further reduce fuel demand, governments and the private sector should provide alternatives to flights (especially shorter ones) by expanding intercity bus and rail options.

Table 31. Adopt sustainable aviation fuel blending requirements

Scenario	Modeled strategy	GHG emissions reduced, MMT CO_2e (% of sector emissions)	
		2035	2050
Plan implementation	Coordinate with the region's airports and carriers to increase use of sustainable aviation fuel, supporting the national goal of achieving a 100% sustainable aviation fuel blend in jet fuel by 2050.	1.4 (4%)	4.9 (14%)

Source: CMAP and E3, 2025.

Sustainable Aviation Fuels Institute, Inc.

The Sustainable Aviation Fuel Institute, Inc. (SAFII), based in Sugar Grove, Illinois, plays a leading role in advancing SAF deployment in the Midwest and nationally. SAFII works across industry, government, agriculture, and research institutions to accelerate the development, certification, and commercialization of low-carbon aviation fuels. Its efforts focus on building reliable feedstock supply chains, supporting producer and airline partnerships, serving as an expert in fuel testing with world-renowned equipment (also made in Illinois), addressing infrastructure and logistics challenges, and advancing workforce development. By convening stakeholders across the aviation, energy, and agricultural sectors, SAFII helps position the Midwest as a hub for SAF innovation and production while supporting a credible pathway for decarbonizing aviation using fuels compatible with existing aircraft and airport infrastructure.

Objective 3: Move people and goods efficiently

Efficient movement of people and goods is essential for a thriving region, and can be achieved in ways that are cleaner, more cost-effective, and less resource intensive. Reducing VMT not only lowers emissions but also eases congestion, makes better use of existing infrastructure, and enhances overall quality of life. It can reduce electric grid demand, supporting the transition to electric vehicles while reducing costs. Expanding access to transit, walking, biking, and efficient freight systems promotes active lifestyles, strengthens communities, and helps avoid the environmental and financial costs of growth in driving.

Strategies to move people and goods more efficiently reduce emissions by decreasing the number and length of vehicle trips. Greater Chicago can achieve these reductions through approaches such as road pricing, shifting travel to transit and active modes, and deploying intelligent transportation systems that improve street network performance by reducing idling, stop-and-go traffic, and crashes.

To reach the plan's transportation emissions target, the region must reduce per capita VMT by 12 percent from 2020 to 2050 — a change projected to cut transportation emissions by 11 percent relative to the current policy scenario (Table 32). Making these reductions requires coordinated planning across transportation, housing, and land use. The following strategies outline transportation approaches that can be implemented across the greater Chicago region, while the buildings chapter explores the housing and land use strategies that also support VMT reduction. While the strategies included under this objective were not assessed for their individual contributions to VMT reduction, they are included as a set of strategies that, when implemented together, are essential to achieving VMT reduction targets and emissions reductions.

Table 32. Reduce vehicle miles traveled

Scenario	Modeled strategy	GHG emissions reduced, MMT CO_2e (% of sector emissions)	
		2035	2050
State and local	Achieve a 5% reduction in VMT by 2030 and 16% by 2050 below business-as-usual trends. While overall VMT increases, the trend equates to a 12% reduction in VMT per capita from 2020 to 2050.	2.5 (7%)	3.8 (11%)

Source: CMAP and E3, 2025.

Analyzing transportation decarbonization strategies and impacts on the electric grid

CMAP, in partnership with ComEd, the Respiratory Health Association, and Argonne and Oak Ridge national laboratories, is participating in the U.S. Department of Energy's Energy to Communities Initiative, administered by the National Lab of the Rockies. Through this effort, CMAP and its partners are analyzing how to decarbonize the transportation sector and how these strategies will affect the electric grid, advancing the goals of the comprehensive climate action plan. The analysis will examine how strategies such as road pricing, transit expansion, and intelligent transportation systems can be designed to reduce VMT and contribute to regional emissions reductions.

3.1 Implement road pricing

Advancing road pricing mechanisms can reduce congestion, encourage mode shift, and lower VMT by making driving costs more reflective of its true impacts. These strategies work by increasing the cost of driving — per mile, per trip, or per gallon — to influence travel behavior. When driving costs rise, travelers are more likely to shift to lower-cost modes such transit or active transportation, or adjust trip timing to avoid congestion.

Pricing mechanisms can take several forms, including variably priced lanes or facilities, cordon charges, or road usage charges based on miles traveled. Existing tools, such as parking pricing and the motor fuel tax, also shape travel choice. Implementing a road usage charge was recommended in both GO TO 2040 and ON TO 2050 — northeastern Illinois' most recent regional comprehensive plans — as a way to generate sustainable transportation revenue while managing travel demand.[215] Greater Chicago should continue to explore a road usage charge and other pricing mechanisms to assess their potential to fund the transportation system and reduce emissions — both by encouraging shifts to EVs and by lowering overall traffic volumes.

Pricing mechanisms are most effective when paired with reliable travel alternative and when revenues are reinvested in improved transit and active transportation options. Because these policies disproportionately impact low-income households, implementation must also include measures to offset increased costs and ensure fair outcomes.

3.2 Increase transit ridership

Expanding and improving transit service is essential to reducing emissions and providing fair, efficient mobility across the region. Transit moves people more efficiently on a per capita basis than single-occupancy vehicles, making it a cornerstone of a sustainable transportation system. It is also a lifeline for riders with low incomes, seniors, youth, and individuals with disabilities, connecting them to jobs, education, healthcare, and daily needs. Strategic investments that increase transit ridership can simultaneously reduce emissions, strengthen communities, and enhance mobility for all.

To attract and retain riders, transit agencies and departments of transportation should enhance the frequency, speed, reliability, and coverage of service, while improving cleanliness, safety, and security. Infrastructure investments, such as bus-only lanes and transit signal priority, can make bus service faster and more reliable. Similarly, shifting towards a regional rail model with all-day, frequent service and better connections across modes would align with today's post-pandemic travel needs. Together, these improvements make transit a more convenient, cost-effective, and appealing choice.

The recently approved Northern Illinois Transit Authority (NITA) Act establishes the stable funding and governance reforms needed to sustain and strengthen public transit across the region, a critical step to ensure transit's role in transportation decarbonization. Building on the vision set forth in the *Plan of Action for Regional Transit*, this legislation averts the looming near-term fiscal cliff caused by chronic underfunding and post-COVID ridership shifts.[218] Looking ahead, for transit to play a central role in reducing transportation emissions, NITA and regional partners must work together to both stabilize operations and invest in a more ambitious regional transit system.

Finally, increasing transit ridership also depends on how communities are built. Transit agencies, local governments, and developers should work together to focus housing, jobs, and services near train stations and bus stops through transit-oriented development. Expanding transit-oriented development allows more residents to meet daily needs without relying on a vehicle for every trip. See Objective 1: Encourage compact and efficient development in the building sector for more details.

New York's congestion pricing reduces congestion and improves air quality

New York City's congestion pricing program, launched in January 2025, charges vehicles entering the designated congestion relief zone in lower Manhattan — and is already demonstrating measurable benefits. In the first 6 months, traffic entering the zone declined, overall vehicle entries dropped by roughly 11 percent, and fine particulate air pollution fell by about 22 percent.[216] While the program is designed to improve travel times, it also provides a range of co-benefits, like safer streets, cleaner air, reduced emissions, and dedicated revenues for transit.[217] Revenues are on track to support large capital investments in regional transit improvements, positioning congestion pricing as a model for aligning traffic management with emissions reduction, public health, and transit goals.

3.3 Increase active transportation

Active transportation — walking, biking, scootering, and other micromobility options — must become a more integral part of how people move throughout the region. While recent investments in greenways and trails have expanded recreational opportunities, greater emphasis is needed on building everyday mobility networks that allow residents to safely and conveniently travel without a car. Increasing active transportation reduces VMT, lowers emissions, and supports healthier, more connected communities.

State, regional, and local governments should invest in well-connected sidewalks, crosswalks, and physically protected bike lanes, particularly near transit, employment centers, and community destinations. These facilities should be designed for users of all ages and abilities and meet accessibility standards. Lighting, street trees, public art, and other complete streets elements enhance safety, comfort, and enjoyment, encouraging more people to choose active travel.

Shared micromobility programs, such as Divvy in Chicago and Cycle219 in northwest Indiana, expand access to active transportation through the availability of bikes, e-bikes, and e-scooters. Regional and local partners should coordinate to strategically locate micromobility docks near transit stops and key destinations, closing "first mile, last mile" gaps. Expanding these programs beyond current service areas can further increase access, enabling travelers to combine active transportation and transit for more of their daily trips.

Divvy supports active transportation in Chicago

Divvy is a bike share system that provides bikes, e-bikes, and e-scooters at more than 600 stations across the City of Chicago and nearby communities. Over 11 million trips were taken through Divvy in 2024, setting a new annual record and reflecting growing demand for access to shared micromobility in the region.[219] Such programs expand mobility options and make it easier for travelers to choose active transportation over driving, especially for short trips and transit connections.

3.4 Deploy intelligent transportation system technologies and other operational improvements

State, county, and municipal departments of transportation should implement intelligent transportation system technologies to reduce stop-and-go traffic, idling, and crashes. Intelligent transportation systems use communications and information technologies to improve system performance, often providing emissions reductions more cost-effectively than building new infrastructure.

Key intelligent transportation system applications include centrally controlled traffic signals, optimized signal timing for efficient corridors, transit signal priority, and bus queue-jumping to improve speed and reliability. Active traffic management can also help maintain traffic flow during crashes, construction, special events, or adverse weather, reducing delays and associated emissions. While efficiency improvements can sometimes increase travel demand by lowering travel time costs, pairing intelligent transportation systems with travel demand management and enhanced alternatives, such as transit, walking, and biking, can help ensure net reductions in VMT and emissions.

3.5 Improve supply chain management and freight efficiency

To reduce GHG emissions from freight operations, regional freight stakeholders should improve vehicle and infrastructure utilization, optimize travel schedules and routes, and plan logistics facility locations more strategically. These actions can shorten or eliminate trips, reducing VMT and emissions. Coordinated truck permitting and local restrictions can further encourage efficient routing and facility placement.

Shifting freight to rail (where feasible) can reduce truck trips and associated emissions. Additional strategies, such as off-peak deliveries, micromobility-based last-mile solutions, consolidated shipments, and delivery lockers, can improve efficiency, lower congestion, and decrease fuel consumption during peak periods.

08

Waste

About this chapter

This chapter outlines waste's role in achieving the region's reduction targets, including current conditions, modeled scenarios, and key objectives and strategies. It shows how coordinated action across state, local, federal, and private partners can deliver a 27 percent reduction in waste emissions by 2050, with select measures quantified to show the scale and pace of change required.

Waste objectives and strategies

1. Reduce and divert organic waste from wase streams

- 1.1. Develop statewide waste reduction plans
- 1.2. Expand organic waste collection programs
- 1.3. Set product degradability labeling requirements

2. Reduce inorganic landfill waste and improve waste management practices

- 2.1. Adopt extended producer responsibility and reduce single-use materials
- 2.2. Divert reuseable building materials and reduce demolition
- 2.3. Expand municipal recycling streams and reduce contamination

3. Expand landfill biogas collection

While the waste sector represents the smallest share of total regional emissions, it is essential to meeting climate goals and protecting community health. Achieving deep reductions requires systemic change, transforming how waste is generated, collected, processed, and reused. This includes reducing waste at the source, diverting organic materials from landfills through composting and anaerobic digestion, recovering and recycling inorganic materials, and modernizing landfill gas capture systems. Advancing these strategies will depend on multi-agency collaboration to expand organics diversion infrastructure and develop integrated waste-to-energy solutions that connect the waste, energy, and transportation sectors. These actions will not only lower GHG emissions, but also reduce pollution burdens, conserve resources, and advance a more circular, resilient, and economically efficient regional waste system.

Most emissions come from organic waste

Waste accounts for approximately 0.6 percent of the region's GHG emissions (0.96 MMT CO_2e). Actual regional emissions are likely underestimated, since much of the region's waste is transported and disposed of outside of the planning area.[220] Nearly 20 percent of regional waste-related emissions occur in DeKalb County, though most of that waste likely originates from other parts of the region or state (Figure 30). Cook County alone sends waste to more than 30 landfills across northern Illinois and Indiana, only 5 of which are located within the region.[221]

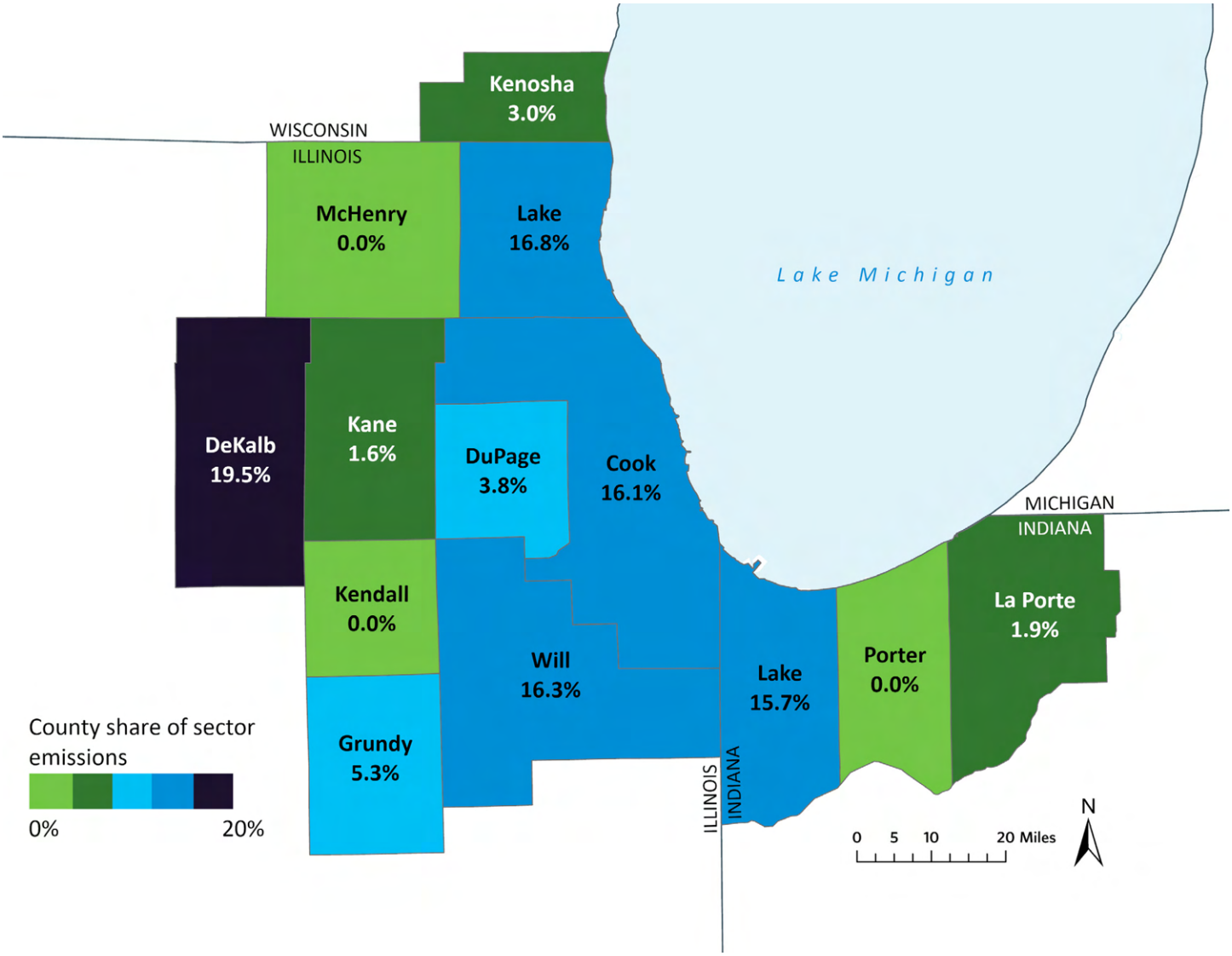
Emissions stem from methane and other gases released as organic waste decomposes in landfills. Additional emissions come from landfill gas flaring, which reduces methane release but still emits carbon dioxide, and waste operations, which can generate pollutants that threaten groundwater and public health for nearby communities.

Nationally, landfill emissions have decreased nearly 16 percent from 2005 due to gas capture and organic waste diversion.[222] While these trends are promising, further reductions are needed to reach the region's GHG reduction target and mitigate the health risks and negative impacts landfills can have on communities.

A circular waste system offers climate and health benefits

Reducing waste emissions requires coordinated action across every level of government and the private sector, as well as widespread public participation. State and local governments can lead by establishing waste reduction plans, setting diversion targets, expanding organics and recycling infrastructure, and adopting consistent product labeling and producer responsibility standards. Waste haulers, landfill operators, and processors can modernize facilities and adopt technologies to recover materials and capture landfill gas. At the same time, lasting progress depends on residents and businesses changing their waste management habits — composting, recycling, and reducing consumption of single-use products. While regional recycling rates currently lag behind national averages, these coordinated actions present a clear opportunity to expand waste diversion, modernize systems, and transition toward a truly circular waste economy.[223,224]

Figure 30. Waste sector greenhouse gas emissions by county in the region, 2020



Note: Emissions in this inventory are attributed to the location of landfills rather than where waste is generated. As a result, some counties appear to have little or no waste emissions simply because they lack active disposal sites.

Source: CMAP 2020 GHG Inventory, 2024.

Reaching the 2050 target

The waste sector must reduce emissions by at least 27 percent below 2020 levels by 2050 to meet regional climate goals. Achieving this target requires expanding landfill gas capture, scaling up waste diversion, and shifting both policy and behavior toward a circular materials economy that minimizes disposal.

Current policy scenario

If no new policies are adopted, waste emissions are expected to remain relatively constant, with a slight increase anticipated due to population increases in the region (Figure 31).[226] This underscores the need for expanded initiatives to drive meaningful reductions.

Plan implementation scenario

This scenario achieves the 27 percent reduction target, based on three objectives:

1. Reduce and divert organic waste from waste streams.
2. Reduce inorganic landfill waste and improve waste management practices.
3. Expand landfill biogas collection.

These outcomes reflect modeled reductions from two of the seven waste strategies.[227]

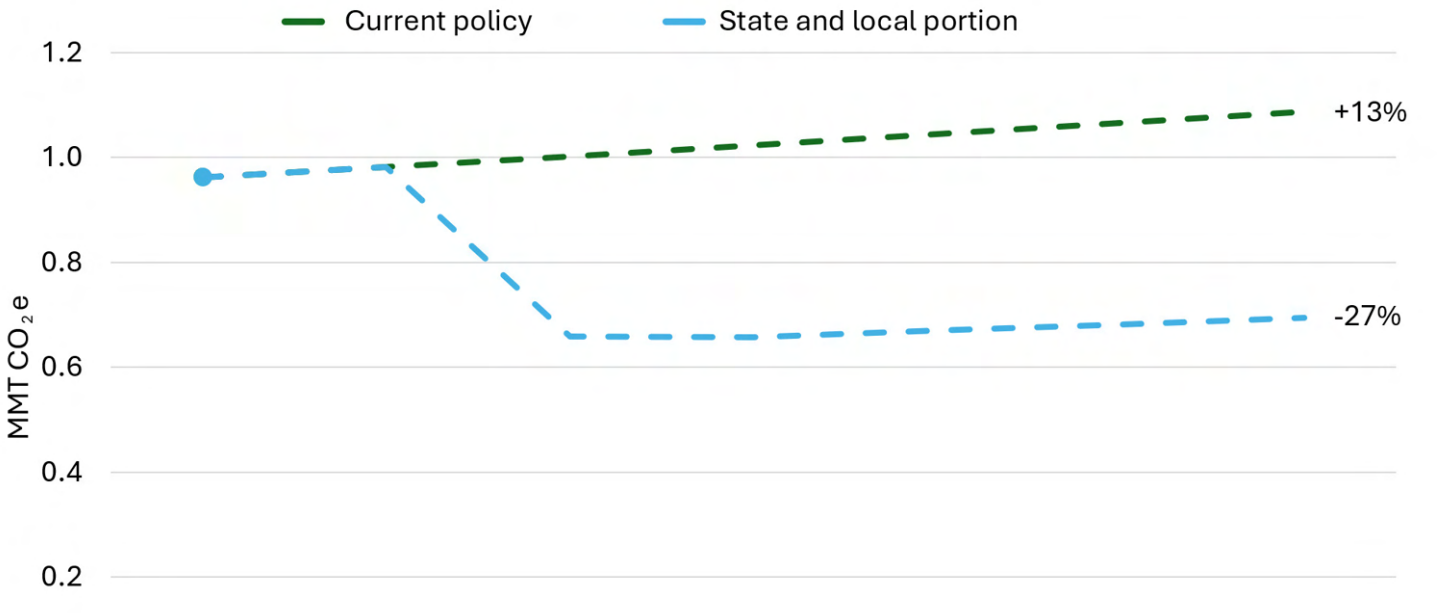
State and local role

While federal policies can accelerate progress through funding for waste infrastructure, landfill gas capture, and circular economy initiatives, achieving deep and lasting reductions depends on state and local leadership (Figure 31). Expanding composting capacity, standardizing recycling programs, advancing extended producer responsibility, and modernizing landfill biogas collection systems are all pivotal to achieving regional goals.

Modeling assumes early and decisive action. As a result, slight emissions increases are projected later in the scenario after initial declines. This highlights the need for additional work in this sector to protect public health, reduce pollution burdens, and advance environmental justice.

The following objectives and strategies outline specific actions needed by federal, state, and local governments as well as partners to achieve these reductions. Find details on modeled strategies in Appendix D.

Figure 31. Waste greenhouse gas emissions by scenario, MMT CO_2e (2020-2050), and percent reduction from 2005 levels by 2050



Note: State and local portion encompasses the plan implementation scenario.

Source: CMAP and E3, 2025.

Objective 1: Reduce and divert organic waste from waste streams

Organic waste decomposition is a major source of methane emissions in the region. In Cook County, organic waste accounts for one-third of municipal landfill material.[228] Much of this waste could be diverted away from landfills and, instead, be reduced, reused, composted, or processed through anaerobic digestion. These lower-emission methods can significantly reduce landfill volumes and methane emissions.

1.1 Develop statewide waste reduction plans

Achieving the plan's reduction target requires that states develop comprehensive waste reduction plans setting statewide targets to divert organic waste from landfills by 50 percent by 2030 (Table 33).[229] All three states in Greater Chicago require local or regional solid waste planning, but none have statewide diversion or organics targets.

In Illinois, counties must prepare 20-year solid waste management plans under the Illinois Solid Waste Planning and Recycling Act; however, the state lacks an overarching framework to align county plans toward shared targets. Wisconsin requires counties and municipalities designated as responsible units to maintain Wisconsin Department of Natural Resources-approved recycling or solid waste plans. Indiana's solid waste management districts develop long-range district plans reviewed by the Indiana Department of Environmental Management. Across the region, these decentralized efforts vary in scope and enforcement, limiting coordination and consistent measurement of outcomes.

Building on existing county and district planning frameworks, states could establish unified waste reduction plans to set diversion benchmarks, track progress, and provide technical and financial assistance to local governments. This approach follows best practices, such as Washington state's *Use Food Well Washington Plan*, as well as guidance from USEPA's *Quantifying Methane Emissions from Landfilled Food Waste*.[230] If fully implemented, the region could see a 28 percent reduction in emissions by 2050 relative to the current policy scenario.[231]

Table 33. Establish statewide targets and plans to reduce food waste by 50 percent by 2030

Scenario	Modeled strategy	GHG emissions reduced from current policy scenario, MMT CO_2e (%)	
		2035	2050
State and local	Set statewide targets to reduce food waste going to landfills by 50% by 2030.	0.3 (28%)	0.3 (28%)

Source: CMAP and E3, 2025.

1.2 Expand organic waste collection programs

Commercial and industrial facilities produce large volumes of organic waste. A recent Illinois law mandates that large event spaces in counties with composting facilities provide compost collection bins at all events.[232] Indiana and Wisconsin can implement similar large event composting requirements. Several peer states have implemented more expansive commercial composting laws that mandate composting for supermarkets, industrial food manufacturers, and other commercial food distributors.[233] Several grocery stores, universities, and school districts across the region already voluntarily send food or food scraps to compost facilities or anaerobic digesters.[234] To expand commercial and industrial composting in the region, states should adopt compost mandates that extend to food processing plants, school districts, big-box grocery stores,[235] and other food retailers, such as local grocery stores, supermarkets, and restaurants.

To address household food waste, municipalities should expand residential and commercial food scrap, yard waste, and compost collection programs. More than 100 municipalities in Illinois already offer these services, but coverage remains uneven.[236] Since 1996, Indiana has banned the disposal of most yard waste in landfills.[237] Many communities provide curbside leaf and yard waste collection or offer drop-off options at municipal or county composting facilities. In 2020, the three Indiana counties in the greater Chicago region diverted 60,437 tons of organic materials from landfills to composting facilities. In 2024, Porter County Recycling District launched a food composting pilot project, expanding local organics recovery efforts.

To assist municipalities that may lack resources to establish their own compost collection services, counties could help fill gaps by establishing free, local organic waste drop-off sites and seasonal yard waste collections, such as Christmas tree and pumpkin collection. Counties and states can provide technical assistance and

develop sample franchise agreements during the refuse service bidding process to ensure comprehensive organic waste collection.[238]

To support widespread adoption, state and local governments should invest in incentives, outreach, and education to encourage participation and clarify what materials are accepted. Local governments can also partner with entities like the University of Illinois Extension to conduct food waste prevention outreach and education.[239] Counties can further strengthen the system by requiring the use of compost soils in landscaping projects, creating reliable demand for compost and supporting local processing facilities.


Source: Green Era.

Green Era Campus commercial food waste recycling and anaerobic digester

In 2023, Green Era completed the nation's first community-owned anaerobic digester dedicated exclusively to food waste at its campus in Chicago's Auburn Gresham neighborhood. By diverting inedible food waste from landfills, the facility generates renewable energy, produces tons of nutrient-rich soil, and supports job creation.[240] Through partnerships with Mariano's, ALDI, the Greater Chicago Food Depository, and others, Green Era now diverts more than 100 million pounds of food waste annually from landfills.[241]

1.3 Set product degradability labeling requirements

Effective organic waste diversion often depends on consumers to sort their waste correctly. Clear product labeling can make this easier. Several states require standardized degradability labeling to help consumers easily distinguish compostable items from non-compostable ones and reduce contamination in compost streams.[244] Such requirements mandate that products be marked with the word "compostable" and have distinct green or brown colored logos. Legislation introduced at the federal level encourages states to develop best labeling practices but falls short of setting standardized requirements.[245] States in the region can adopt product labeling requirements similar to peer states and advocate for these standards at the federal level.

Source: The Urban Canopy.

City of Evanston, residential organic waste programs

Since 2017, Evanston, Illinois, has partnered with The Urban Canopy (recently merged with the Collective Resource Compost Cooperative) to expand organic waste services to residents and businesses.[242] Through this partnership, residents can access curbside drop-off food scrap collection, seasonal yard waste services, and guidance for backyard composting. The city's franchise agreement with the co-op makes services more affordable and accessible. Today, the co-op partners with 60 communities across the region and collects more than 40 tons of organic waste each week.[243]

Objective 2: Reduce inorganic landfill waste and improve waste management practices

Inorganic materials such as metals, glass, plastics, and building materials from construction and demolition take hundreds or thousands of years to decompose — and can account for nearly half of municipal landfill contents.[246] While construction and demolition materials are often sent to dedicated landfills, national estimates suggest about 25 percent end up in municipal landfills.[247] This contributes to space constraints, complicates organic waste decomposition, and can allow hazardous materials, like batteries and heavy metals, to leach into soil and water. Reducing inorganic waste in landfills frees space, eases waste management challenges, and lowers public health and environmental risks. Recovering and reprocessing these materials also reduces demand for new production, cutting emissions in other sectors.

2.1 Adopt extended producer responsibility and reduce single-use materials

Waste emissions can be reduced at the source by producing and consuming fewer single-use products or other inorganic materials. State and local governments can set bans, restrictions, or fees to limit these materials. For example, Illinois has banned Styrofoam products in government buildings and is considering expanding the ban to all food retailers.[248] Indiana and Wisconsin should adopt similar measures, and all three states should broaden their bans to cover additional single-use products.

Extended producer responsibility programs offer a more comprehensive solution by shifting accountability from consumers to producers. Under these programs, manufacturers are required to manage recycling and disposal of their products throughout their lifecycle. States can mandate such programs for certain inorganic materials that are difficult to dispose of in traditional waste streams, such as packaging, textiles, batteries, and electronics.

For example, California's SB 54 mandates that producers make all single-use packaging recyclable or compostable, reduce overall plastic packaging by 25 percent by 2032, and fund the collection and recycling of their products.[249] Such programs not only shift the burden of recycling from consumers but also incentivize producers to responsibly design products that are easier to reuse, recycle, or compost. This ultimately changes the composition of materials entering the waste stream and reduces emissions associated with their disposal.

2.2 Divert reuseable building materials and reduce demolition

Construction and demolition materials in landfills pose unique capacity challenges due to their large volume. Promoting material circularity — through reuse, recycling, or repurposing — can reduce landfill volume and ease capacity constraints. Deconstruction, the process of dismantling buildings to recover reusable materials, can keep construction debris out of landfills. States and counties can support deconstruction over demolition through financial and technical assistance programs.

Counties and municipalities can update construction and demolition ordinances to require or set targets for recovering or recycling a portion of debris.[250] Local building codes can also encourage deconstruction-friendly design, such as using mechanical fasteners and durable materials, to make structures easier to adapt, dismantle, or reuse.

To create a market for repurposed materials, municipalities can partner with local organizations to create construction material reuse warehouses, such as Habitat for Humanity's ReStore, across the region.[251]

2.3 Expand municipal recycling streams and reduce contamination

Recycling and recovering materials reduces the amount of inorganic waste sent to landfills. Inorganic waste, such as plastics, metals, and glass, can be recycled or recovered through traditional recycling streams and services. Across the region, municipal recycling programs vary both in their design (with some offering curbside collection and some offering drop-off locations only) and in the materials they accept (with some excluding glass or certain types of plastic).

Municipalities can expand services to accept all plastics and glass and increase participation by requiring waste haulers to provide bundled or no-cost recycling service as part of contracts. The producers of these materials can support these activities through partnerships or extended producer responsibility programs. Counties can provide financial and technical assistance to help municipalities establish and expand curbside collection services.[253]

Contamination is a major challenge: when recyclables are mixed with non-recyclables, the entire batch may be landfilled. Municipalities can reduce contamination by adopting dual-stream recycling, where residents and businesses separate recycling into two bins instead of one.[254] Typically glass, metal, and plastic are placed into one bin and paper products are placed into the other. Expanding outreach and education to clearly communicate which materials are accepted also improves program effectiveness and landfill diversion.


Source: Rheaply.

Advancing a circular economy through material reuse: Rheaply

Rheaply is a digital platform that supports waste reduction and circular economy practices by helping organizations track, manage, and redistribute physical assets instead of sending them to landfill.[252] Through its software and integrated services, Rheaply helps organizations inventory surplus materials — such as furniture, equipment, and building materials — and facilitates reuse, resale, donation, remanufacturing, or responsible recycling at scale. By connecting organizations with internal users, manufacturers, and external partners through coordinated and auditable workflows, Rheaply replaces fragmented disposal practices with more efficient, transparent systems. These approaches reduce waste and embodied carbon, lower capital costs, and extend the useful life of materials while delivering measurable environmental and community benefits.

Objective 3: Expand landfill biogas collection

Landfill biogas from decomposing waste can be captured through gas collection and control systems or biofilters for smaller sites, preventing methane from entering the atmosphere. Collected gas can be flared or refined into renewable natural gas (RNG).[255] While most regional landfills have gas collection and control systems installed, undetected or unaddressed leaks can occur over time due to cracked pipes or inadequate monitoring and maintenance.

While landfills are already subject to federal rules, the region's ability to meet its emissions reduction targets requires state action to expand gas capture by lowering thresholds that trigger landfill control and reporting requirements, improving requirements for system monitoring and maintenance, and incentivizing (or requiring) a shift from flaring to RNG production.[256] Doing so will reduce emissions from and maximize the climate benefits of landfill operations (Table 34). States can accelerate gas collection and control system installation timelines, require biofilters at smaller landfills, and use incentives, such as grants, tax credits, and technical assistance to support adoption.

Once biogas has been captured, its disposal must be subject to additional regulation. Open-air flaring continues to emit methane, carbon dioxide, and PM2.5. Landfill operators should be required to use enclosed flares or transport captured gas to an RNG facility, consistent with California's existing rule.[257] RNG use is addressed in the energy generation chapter.

States should also mandate that landfill operators monitor for and repair detected methane leaks. Technologies such as remote sensing via drones or satellites can be used to improve leak detection. Colorado provides a useful example of these monitoring and maintenance standards in action.[258]

Table 34. Expand and improve the collection of biogas from landfills

Scenario	Modeled strategy	GHG emissions reduced from current policy scenario, MMT CO_2e (%)	
		2035	2050
State and local	Require capture and/or restrict open-air flaring of landfill gas at more landfills.	0.11 (10%)	0.12 (11%)

Source: CMAP and E3, 2025.

09

Water and wastewater

About this chapter

This chapter outlines the water and wastewater sector's role in achieving the region's reduction targets, including current conditions, scenarios, sector-specific reduction targets, and the key objectives and strategies needed to meet them. The strategies reflect a combination of state, local, federal, and private-sector actions, with select measures quantified to show the scale and pace of change required.

Water and wastewater objectives and strategies

1. Transform water and wastewater facilities and processes

1.1. Replace outdated wastewater treatment equipment

1.2. Increase energy efficiency of facility buildings and equipment

1.3. Recover and generate clean energy

2. Reduce water use

2.1. Reduce water loss

2.2. Improve fixture efficiency through standards, incentives, and codes

2.3. Incorporate water efficiency standards in new residential development

2.4. Advance water reuse

3. Improve water quality

3.1. Protect and restore natural systems to safeguard water quality

3.2. Expand green infrastructure investments

The water and wastewater sector represents an important part of Greater Chicago's overall reduction goals and ability to support reliable, affordable, and resilient public services. Achieving deep reductions requires systemic change — modernizing treatment and distribution systems, improving energy efficiency, reducing water use, expanding water reuse, and generating clean energy from treatment byproducts. These actions will not only lower GHG emissions but also strengthen water reliability, reduce operating costs, and enhance community and ecosystem health across the region.

Wastewater treatment drives most sector emissions

The water and wastewater sector includes emissions from water utility systems and wastewater treatment plants, which together produce about 1.1 percent of total regional emissions, or 1.70 MMT CO_2e.[259] Approximately 84 percent of these emissions come from energy consumed during and emissions from wastewater collection, conveyance, treatment, and byproduct disposal, including stormwater treated in combined sewer systems. The remaining 16 percent result from the treatment, pumping, and distribution of drinking water.

Facilities serving residential, commercial, and industrial users are distributed throughout the region, with many municipalities operating their own systems. The Metropolitan Water Reclamation District of Greater Chicago (MWRD) operates several water reclamation plants, including Stickney Water Reclamation Plant, which is one of the largest treatment plants in the world. Stickney treats roughly 700 million gallons of wastewater and stormwater daily from 44 communities.[260] Cook County, which includes the MWRD's service area, accounts for nearly two-thirds (64.6 percent or 1.1 MMT CO_2e) of the sector's total emissions, 89 percent of which come from wastewater treatment (Figure 32). From 2005 to 2020, emissions from the MWRD's treatment facilities fell by nearly 19 percent, reflecting improvements in energy efficiency and treatment technologies.[261] Smaller wastewater facilities within the region are taking similar strides. The Downers Grover Sanitary District in DuPage County, for example, has made multiple energy efficiency and renewable energy generation investments, significantly reducing its emissions and becoming a net-zero wastewater facility in 2021.[262]

Declining demand is offset by new users and contaminants

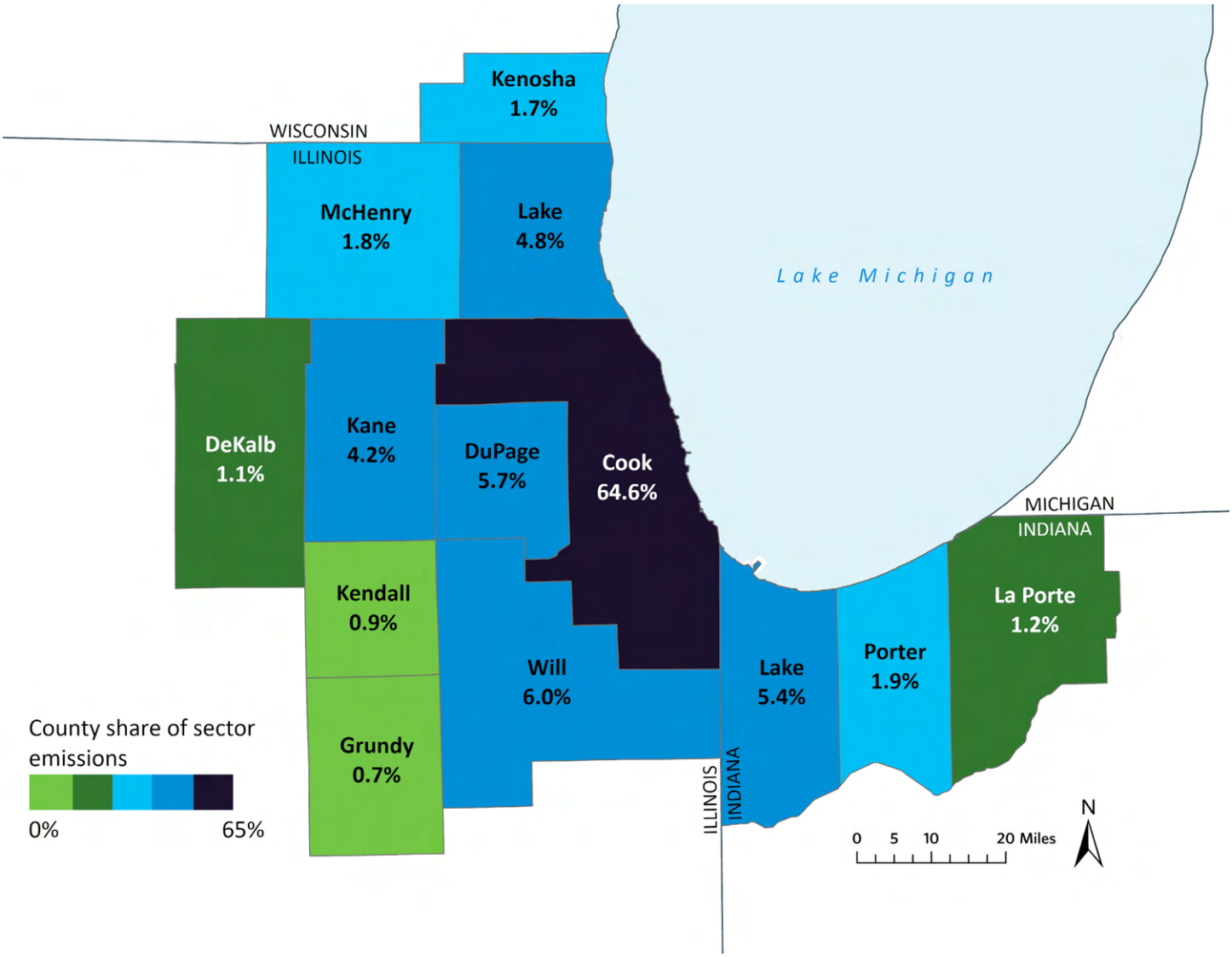
In the seven-county CMAP region, water demand has declined 17 percent since 2007, driven by continued improvements in water conservation and efficiency across residential, commercial, and industrial sectors.[263] However, new large water users like data centers threaten to offset these gains. At the same time, emerging contaminants such as microplastics, PFAS, chlorides, nutrient pollution, and pharmaceuticals, combined with new regulatory requirements and climate change impacts, are increasing the energy intensity of treatment. Advanced filtration technologies and source water protection are essential to manage these challenges while keeping emissions in check.

Integrated water management is key to long-term resilience

Reducing water and wastewater emissions requires coordinated action among utilities, governments, and major water users. Utilities can modernize infrastructure, adopt clean and efficient technologies, and generate

renewable energy on-site through biogas recovery, solar, or other systems. State and local governments can lead by establishing energy performance standards for utility facilities, expanding financial incentives for efficiency upgrades, and supporting workforce training to operate new technologies. Reducing system-wide water use through leak detection, fixture standards, and conservation-oriented rate structures will further lower energy demand and emissions. Finally, integrating water reuse, green infrastructure, and source water protection into planning and investment decisions can reduce both treatment energy and pollution, strengthening long-term resilience. Together, these coordinated actions present a clear opportunity to transform how the region manages water — protecting public health, reducing emissions, and building a more sustainable, climate-ready water future.

Figure 32. Water and wastewater greenhouse gas emissions by county, 2020



Note: Wastewater and water conveyance emissions align closely with population.

Source: CMAP 2020 GHG Inventory, 2024.

Reaching the 2050 target

The water and wastewater sector must reduce emissions by at least 66 percent below 2020 levels by 2050 to align with regional climate goals.[264]

Current policy scenario

If no new policies are adopted, emissions are projected to decline by 24 percent by 2050, largely due to the MWRD's replacement of outdated Imhoff tanks with more efficient treatment systems early in the time horizon.[265] After these improvements, emissions are expected to remain relatively constant — underscoring the need for additional action (Figure 33).

Plan implementation scenario

This scenario achieves the 66 percent reduction target, primarily through the cleaning of the electricity grid. View the energy generation chapter for more information. However, additional actions should be taken directly to improve energy efficiency, electrify equipment, and make additional process improvements. Although these actions could not be quantified at this time, together they establish the foundation for deeper reductions and greater system resilience by mid-century.

The plan organizes this work around three objectives:

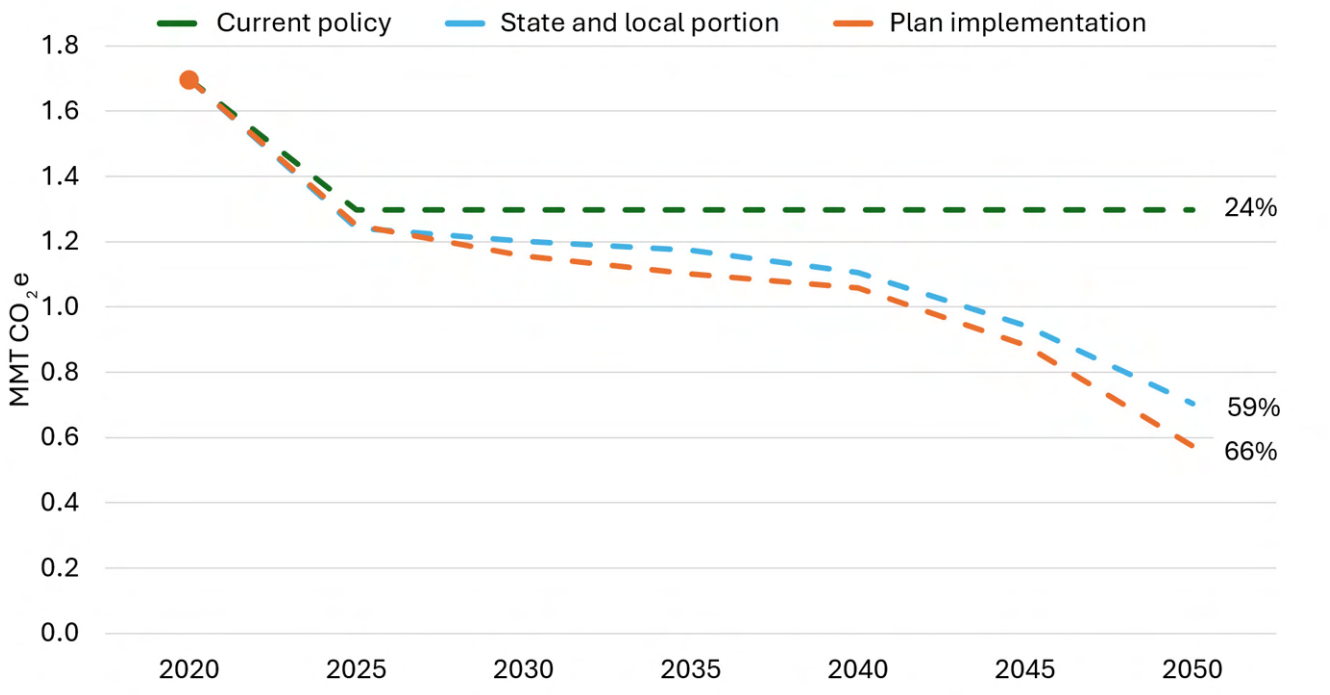
1. Transform water and wastewater facilities and processes.
2. Reduce water use.
3. Improve water quality.

State and local role

Federal action is critical to set the policy framework, establish water efficiency standards, and drive market innovation. Yet, because most water and wastewater systems are managed locally, state and local leadership will determine the pace and scale of implementation (Figure 33).

The following objectives and strategies outline specific actions needed by the federal, state, and local governments as well as utilities, conservation partners, and research institutions to achieve these reductions — highlighting both near-term opportunities and long-term pathways for water transformation. Find details on modeled strategies in Appendix D.

Figure 33. Water and wastewater greenhouse gas emissions by scenario, MMT CO_2e (2020-2050), and percent reduction from 2005 levels by 2050



Note: Between 2005 and 2020, water and wastewater emissions are embedded within the waste sector and cannot be separated; therefore, this chart only shows data starting in 2020. Wastewater treatment plants in the plan implementation scenario experience additional reductions beyond the state and local portion due to building envelop upgrades, which are described in greater detail in the commercial and residential buildings section.

Source: CMAP and E3, 2025.

Objective 1: Transform water and wastewater facilities and processes

Water and wastewater utilities are among the most energy-intensive public facilities, accounting for 30 to 40 percent of total municipal energy use nationwide.[266] These systems rely heavily on the electric grid for pumping, treatment, and distribution. Emissions can be reduced by improving energy efficiency, transitioning to clean and renewable power sources, and capturing energy from treatment byproducts. Beyond electricity use, wastewater treatment also produces methane and nitrous oxide during processing and disposal. Aging infrastructure in the region contributes to leaks and higher emissions. Upgrading to modern, efficient technologies offers significant potential to reduce these emissions.

1.1 Replace outdated wastewater treatment equipment

Wastewater treatment facilities across the region can significantly reduce methane emissions by replacing outdated infrastructure, such as Imhoff tanks, with modern technologies like primary settling tanks. Imhoff

tanks, which rely on anaerobic digestion, release methane directly into the atmosphere because the gas cannot be captured. Although inexpensive to operate, they are far less efficient and far more emissions-intensive than modern treatment systems.

The MWRD demonstrated the benefits of this transition, which are captured in the current policy scenario (Table 35). In 2025, the MWRD decommissioned 90-year-old Imhoff tanks at its Stickney Water Reclamation Plant, previously responsible for 36 percent of the MWRD's total emissions, and replaced them with primary settling tanks and aerated grit facilities.[267] This modernization eliminated a major methane source and is projected to contribute to a 52 percent reduction in the region's non-carbon dioxide wastewater emissions by 2050. Other wastewater treatment plants can achieve comparable reductions by following this example and replacing legacy treatment systems with more efficient technologies.

Table 35. Replacing Metropolitan Water Reclamation District Imhoff tanks

Scenario	Modeled strategy	GHG emissions reduced, MMT CO_2e (% of sector emissions)	
		2035	2050
Current policy	Replace the MWRD's Imhoff tanks with primary settling tanks and new aerated grit facilities by 2025.	0.4 (24%)	0.4 (24%)

Source: CMAP and E3, 2025.

1.2 Increase energy efficiency of facility buildings and equipment

Improving energy efficiency of and increasing electrification at water and wastewater facilities can significantly reduce emissions and operating costs. Energy-intensive processes, especially treatment and pumping, offer the greatest opportunities for reductions. Facilities can install variable frequency drives on pumps to adjust flow to demand and reduce operation during off-peak hours. Wastewater treatment plants can further reduce pumping energy by optimizing wet well control settings, such as adjusting sensor levels to reduce frequent pump cycling and operate pumps closer to their optimal efficiency range. Other improvements include upgrading lighting, temperature controls, and insulation to enhance overall efficiency.

To support these upgrades, states should expand energy assessment programs that help utilities identify and prioritize cost-effective opportunities. The Illinois EPA, in partnership with the Illinois Sustainable Technology Center and Smart Energy Design Assistance Center, offered free energy assessments to public water and wastewater systems — a model that should be reinstated in Illinois and expanded to neighboring states.[268] Financial incentives such as grants, loans, and rebates can help utilities overcome the upfront costs of electrification and energy-efficiency improvements.[269] Workforce training programs focused on installation

and maintenance can ensure new technologies are deployed effectively and reliably. States can also accelerate these upgrades by applying building performance standards to water and wastewater facilities. These energy or emissions reduction targets are applied to buildings over a certain size, requiring that they reduce emissions over time through energy efficiency and electrification upgrades. See Objective 2 in the buildings chapter for more details on building performance standards.

1.3 Recover and generate clean energy

Wastewater treatment plants produce biogas as a byproduct of anaerobic digestion, offering a major opportunity to reduce emissions and generate clean energy. Currently, many facilities flare this gas, releasing methane instead of capturing its energy value. States should establish financial incentive programs, such as grants, tax credits, and renewable energy credits, to help utilities install biogas capture and combined heat and power systems. These systems use biogas to generate electricity and recover waste heat for on-site heating and cooling, significantly improving overall energy efficiency.

Because biogas contains a high concentration of methane, it can also be upgraded to RNG, which can be used for heating, electricity generation, or vehicle fuel. Renewable energy credit programs and other funding mechanisms should explicitly include RNG technologies to encourage wastewater treatment plants to install on-site systems or partner with offsite facilities for biogas processing.

Beyond biogas recovery, water and wastewater utilities can further reduce emissions by generating renewable electricity on-site. Many facilities occupy large parcels of land suitable for solar, wind, or small-scale hydropower installations. In the region, several utilities have already leveraged renewable energy credits and federal grants to deploy solar systems, such as the Fox Metro Water Reclamation District's 2021 solar field in Aurora, Illinois, and the wastewater treatment plant solar installation that began construction in 2024 in Portage, Indiana. Together, these strategies allow utilities to produce clean energy, cut costs, and make critical infrastructure more resilient.

Objective 2: Reduce water use

Reducing water use across the region's drinking water systems is an effective way to cut GHG emissions from treatment and distribution. Every gallon of water that is pumped, treated, or heated requires energy; lowering the volume of water processed directly reduces energy demand and associated emissions. Illinois water-energy research shows that utilities often spend 8 to 13 percent of operating budgets on electricity, and average energy intensity ranges from 1,600 to more than 2,000 kWh per million gallons, depending on source type, meaning even modest water savings can translate into substantial energy reductions.[270] Utilities can modernize infrastructure through audits, leak detection, and targeted repairs to prevent water loss and reduce pumping needs.

Complementary measures — such as replacing outdated fixtures with WaterSense-certified models, updating water efficiency standards, and incorporating water conservation into development standards — further lock in long-term reductions in both water and energy use. Together, these efforts can conserve resources, strengthen system reliability, and advance a more sustainable, low-emission water future for the region.

2.1 Reduce water loss

Reducing water loss is one of the most cost-effective ways to lower both water demand and GHG emissions. Every gallon lost through leaks or system inefficiencies must still be pumped, treated, and pressurized — processes that require significant energy. By reducing losses, utilities not only conserve water but also reduce energy consumption and emissions from treatment and distribution. Water loss results from leaky pipes, storage overflows, inaccurate metering, and unauthorized consumption. The American Society of Civil Engineers estimates roughly 240,000 water main breaks occur each year nationwide, leading to wasted water, energy, and revenue.[271]

Utilities can address losses by developing comprehensive water loss control programs that include audits, leak detection, monitoring, and accurate metering.[272] States, counties, and research institutions can support this work by providing training and technical assistance. Once utilities understand where and how losses occur, they can prioritize investments in infrastructure maintenance and replacement through capital improvement planning.

State and local policies play a critical role. Illinois requires public water utilities that use Lake Michigan water to keep water loss at or below 10 percent, conduct annual water audits, and adopt conservation ordinances and pricing structures that reflect the full cost of water. In Indiana, Code 8-1-30.8 requires all water utilities to complete a validated water audit every other year. In Wisconsin, utilities are required to conduct annual water audits, report water losses, and implement corrective plans when loss metrics exceed thresholds. Expanding requirements to address water loss across Greater Chicago would strengthen accountability and reduce the problem throughout the region. Municipalities can complement state action by requiring regular leak

Minnesota leads on water conservation

Minnesota offers a model for how state leadership can drive meaningful water conservation. The Minnesota Department of Natural Resources (MDNR) maintains a statewide water conservation plan that guides both policy and permitting. Under their permitting system, public water utilities are required to use the best available practices to promote efficient use of the state's water resources.[274]

Public water suppliers serving more than 1,000 people must have an MDNR-approved water supply plan that includes water conservation and efficiency strategies aligned with statewide goals. These suppliers must also:

- Reduce unaccounted water loss to less than 10 percent.
- Reduce residential use to less than 75 gallons per capita per day.
- Achieve at least 1.5 percent annual reduction in industrial, institutional, commercial, and agriculture use.
- Reduce peak demand to less than 2.6 times the average demand.
- Implement conservation-based water rate structures to promote wise use.

detection, source metering, and submetering in multi-tenant buildings, as well as by enforcing penalties for unauthorized water use.

2.2 Improve fixture efficiency through standards, incentives, and codes

Residential indoor water use often accounts for roughly two-thirds of household demand, making it a key opportunity for conservation and emissions reduction.[275] Every gallon saved reduces the energy required to pump, treat, and heat water.

Replacing toilets, faucets, showerheads, dishwashers, and washing machines with high-efficiency devices — such as those certified through the USEPA WaterSense program — is one of the most cost-effective ways to reduce indoor water use. If widely adopted, these upgrades could reduce household water use by more than 35 percent without sacrificing performance.[276] Counties, municipalities, and water utilities can accelerate adoption through rebates, incentives, and code updates. For example, the City of Joliet, Illinois, offers a $100 rebate to replace older, high-volume toilets with WaterSense-labeled models.[277] Municipalities can also require high-efficiency fixtures through plumbing codes and home resale ordinances, verified during inspection, ensuring long-term conservation across both new and existing homes.

Efficiency opportunities also extend beyond the residential sector. Commercial and industrial facilities often use large volumes of water for cooling, sanitation, and process operations. Upgrading to high-efficiency plumbing fixtures, water-cooled equipment, and process technologies — such as closed-loop cooling systems or water recycling and reuse — can significantly reduce both water and energy use. Utilities and local governments can offer targeted rebates or technical assistance to help businesses identify and implement cost-effective upgrades, building on models like the Illinois Sustainable Technology Center's technical assistance programs for industrial water efficiency.

At the same time, federal and state standards are essential to sustain market-wide efficiency. The Energy Policy Act of

1992 established the first national plumbing fixture vstandards, and the WaterSense program, launched in 2006, expanded them with stricter criteria for products that use 20 percent less water than baseline models.[278] However, many homes built before 1993 still rely on inefficient fixtures. In the absence of renewed federal action, states are stepping up — Indiana and Illinois have attempted to adopt new statewide standards that are modeled on or exceed WaterSense and California's benchmarks.[279] Wisconsin should consider comparable standards, and all states should periodically update them to reflect technological advances, if not already required through other water conservation program requirements.[280] Continued federal support for WaterSense will remain key to maintaining consistent savings across the region.

A ready-made tool for water-efficient homes

The USEPA's WaterSense Homes program gives municipalities and builders a ready-to-use framework for constructing water-efficient homes. Certified homes use at least 30 percent less water than typical new homes, saving owners over $700 annually in water and energy costs.[283] These savings exceed what can be achieved through fixture upgrades alone because the specification also requires developers to incorporate other improvements like leak-free plumbing, efficient hot-water distribution, irrigation efficiency, and water-smart landscaping. Certification is verified through an approved home certification organization, easing the burden on local governments.[284] By referencing WaterSense Homes in local codes or incentive programs, communities can advance conservation, lower infrastructure demand, and help residents save money.

2.3 Incorporate water efficiency standards in new residential development

Integrating water conservation into new home construction ensures long-term water and energy savings while reducing the need for costly retrofits later. Developers can minimize leaks, install efficient fixtures and appliances, and design plumbing systems that conserve water.

Municipalities can accelerate these practices by embedding water-efficiency standards into local building codes and permit processes. Requirements can include installing WaterSense fixtures or meeting performance-based standards, verified during inspection or through certification programs. The USEPA's WaterSense labeled homes and RESNET's $HERS_{H2O}$ programs provide proven frameworks for designing and verifying efficient homes.[281]

Financial incentives can further drive adoption. For example, the Central Arizona Groundwater Replenishment District offers builders $1,000 per WaterSense-certified home, while the federal 45L tax credit provides up to $5,000 for homes meeting Zero Energy Ready standards, which often include advanced water-saving features.[282] Though set to expire in 2026, the 45L credit illustrates how federal and local incentives can spur the market for high-performance, water-efficient housing. And while Arizona faces more severe water constraints, portions of Greater Chicago also rely on stressed groundwater sources, making efficiency incentives a valuable tool here as well.

2.4 Advance water reuse

Expanding non-potable water reuse helps reduce both water demand and GHG emissions associated with treatment, pumping, and distribution. By treating and reusing water for purposes that do not require drinking-water quality — such as industrial cooling, landscape irrigation, or construction — utilities and large water users can lower the energy required to produce and deliver potable water. Regional reuse strategies could include building-scale systems that capture greywater for on-site reuse, or district-scale programs that distribute reclaimed water from wastewater treatment plants to nearby industrial or commercial facilities.[285] State and local governments can accelerate adoption through updated plumbing and building codes that allow dual plumbing, streamlined permitting for reuse systems, and financial incentives or grants to offset installation costs.

Reuse programs can also strengthen long-term water reliability by reducing withdrawals from aquifers and surface waters, easing strain on drinking-water systems, and improving resilience during droughts and heat waves. Coordinated regional planning — such as siting high-demand users near wastewater treatment plants — can make reclaimed water use more cost-effective and scalable. Encouraging reuse among large users like data centers and industrial parks can cut energy use and emissions while supporting economic growth across the region.

However, reuse must be implemented carefully to ensure environmental gains aren't offset by higher energy consumption. Advanced treatment technologies, especially those meeting high industrial reuse standards, can increase electricity demand and emissions if powered by fossil fuels.[286] To maximize climate and water-quality benefits, projects should use low-energy treatment and integrate renewable power. Done well, reuse can serve as a cornerstone of both water sustainability and regional decarbonization.

Objective 3: Improve water quality

Improving water quality reduces energy-intensive treatment needs and the associated GHG emissions. Most pollution enters groundwater, surface water, and stormwater through agricultural and urban runoff. Runoff introduces pollutants like nitrates, salts, and emerging contaminants like PFAS, that require advanced, often energy-intensive treatment to meet requirements established through the Safe Drinking Water Act and the Clean Water Act.[287]

These contaminants can make treatment more complex, costly, and carbon intensive. For example, salt from road deicing and water softeners corrodes infrastructure and requires energy-intensive processes like desalination or reverse osmosis. Utilities with PFAS levels exceeding federal standards must adopt advanced technologies such as ion exchange, reverse osmosis, or granular activated carbon to treat water to acceptable levels. For smaller utilities, the high cost of compliance can constrain their ability to invest in advanced treatment processes or in energy-efficient and electric technologies. Additionally, warmer temperatures and drought can elevate pollutants and organic matter like algae in water sources, further increasing energy demands for treatment and pumping. Strengthening land use practices, protecting source waters, and restoring natural systems can prevent these pollutants from entering water supplies in the first place, reducing both treatment costs and emissions while improving public health and ecosystem health.[288]

3.1 Protect and restore natural systems to safeguard water quality

Protecting natural areas and managing development patterns are essential to maintaining the ecosystem services that safeguard water quality. Wetlands, forests, prairies, and riparian buffers naturally filter pollutants, recharge groundwater, and slow runoff. When these lands are lost or degraded, stormwater carries more contaminants into waterways, increasing treatment needs, flooding risks, and infrastructure costs. Integrating water resource protection into land use and infrastructure planning helps preserve these natural functions while supporting sustainable growth. Preserving natural lands and ecosystems also enhances the region's carbon sequestration potential, which this plan addresses in the natural carbon sequestration chapter.

Counties can play a role in this strategy by actively strengthening coordination among local governments. Through this collaboration, they can encourage low-impact development practices, create overlay districts to restrict high-impact development near sensitive areas, and align land use, stormwater, and utility planning. Local governments can adopt source water protection, watershed, and stormwater management plans that include measurable performance standards for maintaining water quality. They can also encourage conversion of turf grass and other highly managed landscapes to native or prairie plantings, extending natural filtration functions into developed areas while reducing runoff, irrigation needs, and maintenance costs. Together, these actions maintain natural water filtration systems, reduce urban runoff, and build climate resilience across the region.

States, counties, and municipalities should also expand funding and workforce programs to restore wetlands and riparian buffers. These efforts can be supported through partnerships with conservation organizations and citizen science programs that engage community members in monitoring water quality. To further reduce pollutants in runoff, local governments can promote sustainable agriculture practices — such as fertilizer management and compost use — and states can provide grants and technical assistance to help unsewered communities replace aging septic systems. Together, these strategies sustain the natural systems that filter water, reduce flooding, and strengthen regional resilience — while also enhancing carbon sequestration and lowering emissions from energy-intensive water treatment.

3.2 Expand green infrastructure investments

Green infrastructure — such as permeable pavements, rain gardens, bioswales, and flood-tolerant plantings — filters and stores stormwater while enhancing resilience. Counties and conservation districts should prepare and update green infrastructure plans, provide training, and offer technical assistance to municipalities. Local governments can update stormwater ordinances to require green infrastructure in new developments and create funding programs, grants, or rebates to support installation. Establishing stormwater utility fees tied to property runoff can ensure a stable revenue stream for ongoing maintenance and investment. In northwest Indiana, NIRPC's Living Streets Policy provides a strong model: it requires local transportation project sponsors to evaluate investing up to 15 percent of project costs in complete streets and green infrastructure features, and offers online guidance and tools to help local officials select and implement these practices effectively.[289]

10

Agriculture

About this chapter

This chapter outlines agriculture's role in achieving the region's reduction targets, including current conditions, modeled scenarios, and key objectives and strategies. It shows how coordinated action across state, local, federal, and private partners can deliver a 27 percent reduction in agriculture emissions by 2050, with select measures quantified to show the scale and pace of change required.

Agriculture objectives and strategies

1. Enhance nutrient management and soil health

1.1. Enrich agricultural soils to increase soil nutrient-holding capacity

1.2. Maximize synthetic fertilizer effectiveness

2. Improve manure and feed management

2.1. Increase the quality of feed in livestock and poultry diets

2.2. Improve manure management

3. Transition agricultural operations to clean energy

Decarbonizing the agriculture sector is essential to achieving climate goals and sustaining the region's long-term environmental and economic health. Emerging climate-smart and regenerative practices can reduce emissions, improve soil and water quality, and strengthen resilience to droughts, floods, and other climate impacts. Achieving these benefits will require systemic change — transforming how crops are produced, nutrients managed, and energy used on farms. This includes optimizing fertilizer application, improving manure and feed management, restoring soil health, and transitioning to clean energy. Together, these actions can reduce emissions while improving productivity, conserving water, and restoring natural ecosystems.

Fertilizers and soil management drive emissions

The agriculture sector produces about 1.3 percent of total regional emissions (2.14 MMT CO_2e). Emissions primarily come from fertilizer application and soil management practices, which release nitrous oxide, followed by manure management and methane from livestock digestion (Figure 34).[290]

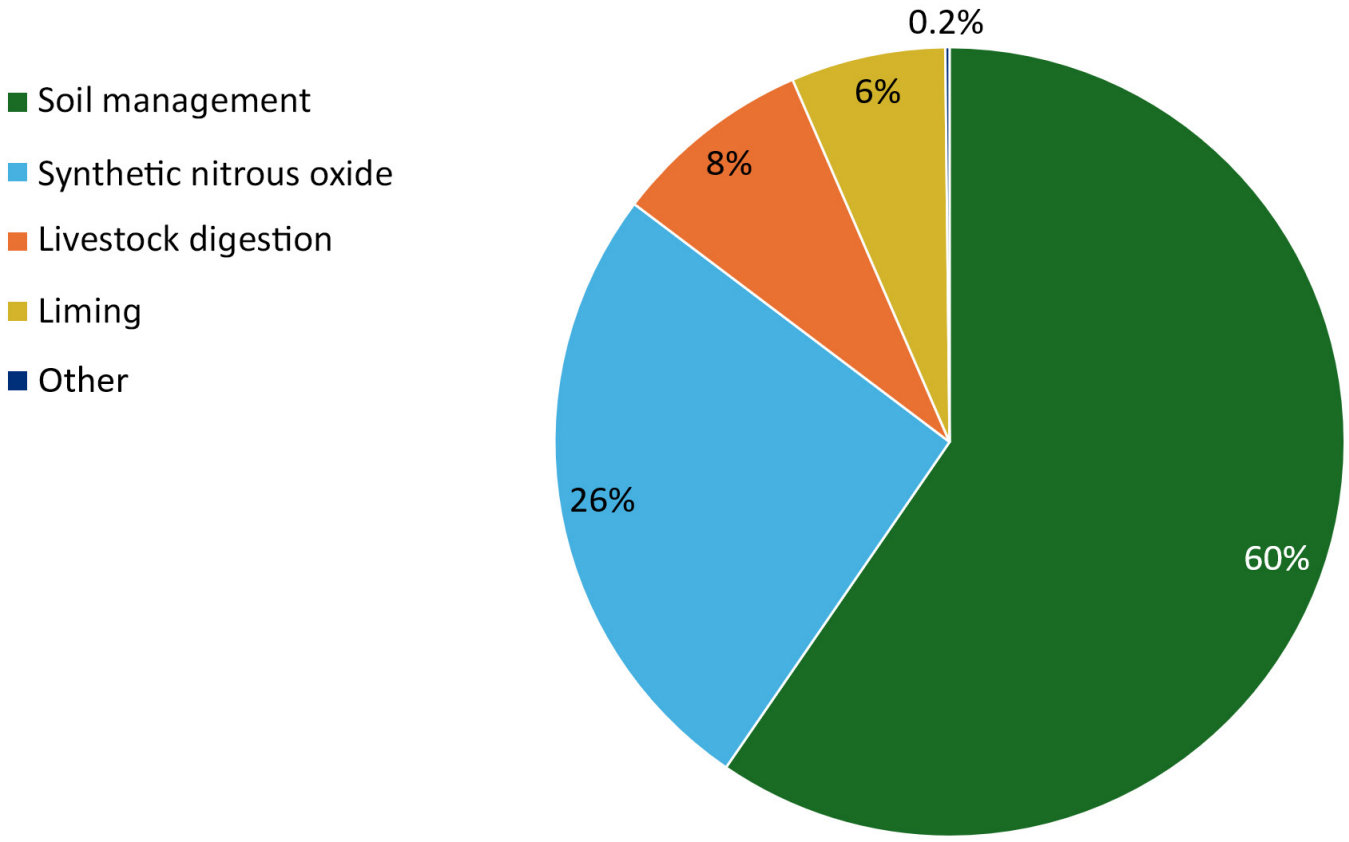
Regional cropland, dominated by corn and soybeans, accounts for the majority of emissions, with livestock representing a smaller but significant share.[291] Nearly 20 percent of agricultural emissions occur in DeKalb County, followed by La Porte, Grundy, and McHenry counties, each contributing about 11 percent. While agricultural emissions have remained largely unchanged since 2005, opportunities exist to reduce them through improved nutrient efficiency, soil carbon sequestration, and methane capture.

Climate-smart practices can improve resilience

Excess fertilizer use contributes to water pollution in the form of nutrient runoff, while degraded soils lose their ability to store carbon. Climate change further amplifies these risks, threatening yields and increasing costs for farmers. At the same time, new technologies and financial incentives create opportunities to reduce emissions while enhancing farm profitability and resilience.

Reducing agricultural emissions requires coordinated action among farmers, agribusinesses, researchers, and governments. Financial incentives, research partnerships, and technical assistance can accelerate adoption of nutrient-efficient practices, regenerative soil management, and clean energy technologies. Together, these actions can lower emissions, enhance productivity, and build a climate-smart, low-carbon agricultural system that supports both farmers and the region's long-term resilience.

Figure 34. Agriculture greenhouse gas emissions by subsector, 2020



Note: The other category includes emissions from manure management, organic nitrous oxide, and residue burning. Liming is the practice of applying calcium or magnesium from limestone or dolomite to neutralize acidity and improve soil health.

Source: CMAP 2020 GHG inventory, 2024.

Reaching the 2050 target

The agriculture sector must reduce emissions by at least 27 percent below 2005 levels by 2050. Achieving this will require broad adoption of climate-smart and regenerative practices that cut methane and nitrous oxide emissions while improving soil health and productivity.

Current policy scenario

If no new policies are adopted, agriculture GHG emissions are expected to remain largely unchanged (Figure 35). This illustrates how further action is needed.

Plan implementation scenario

While federal programs and global market trends can support progress, deep and lasting reductions depend on state and local leadership to expand financial incentives, technical assistance, and research partnerships. The plan implementation scenario achieves the 27 percent reduction target, based on three objectives:

1. Enhance nutrient management and soil health.
2. Improve manure and feed management.
3. Transition agricultural operations to clean energy.

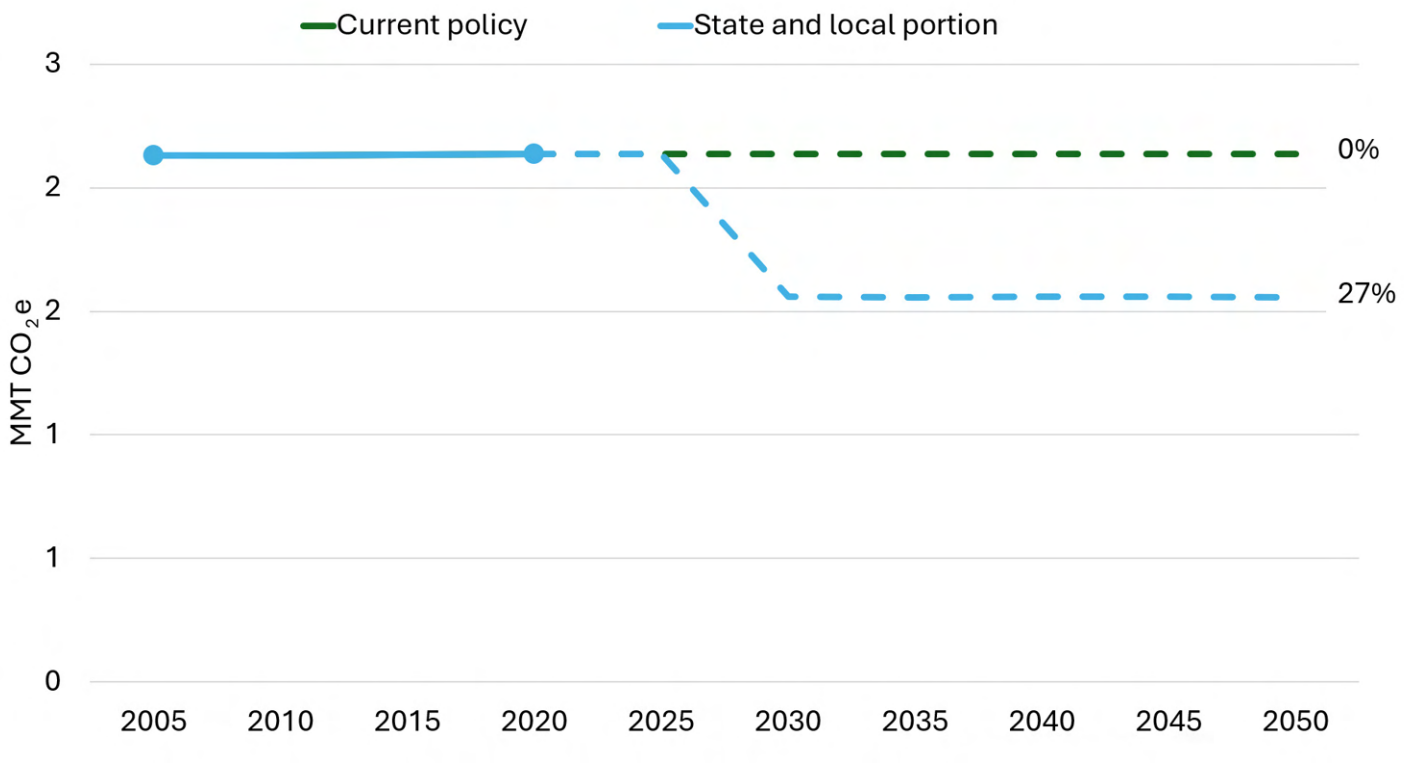
The plan implementation scenario reflects modeled reductions from 2 of the 5 agriculture strategies.

State and local role

Given that the region is highly urbanized, this plan focuses on advancing climate-smart and regenerative practices locally, while recognizing that larger shifts in the food system and agricultural policy require leadership at state, national, and global scales. While not all strategies could be modeled, together they lay the groundwork for deeper reductions and a more efficient, resilient sector by 2050 (Figure 35).

The following objectives and strategies outline specific actions needed by state and local governments as well as non-government partners to achieve these reductions — highlighting both near-term opportunities and long-term pathways for agricultural transformation. Find details on modeled strategies in Appendix D.

Figure 35. Agriculture greenhouse gas emissions by scenario, MMT CO_2e (2005-2050), and percent reduction from 2005 levels by 2050



Note: State and local portion encompasses the plan implementation scenario.

Source: CMAP and E3, 2025.

Objective 1: Enhance nutrient management and soil health

Healthy agricultural soils play a critical role in reducing emissions.[294] Enriched soils retain more nutrients, reducing the amount of fertilizer needed to maintain crop yields. Improved land management practices that enhance soil health, water dynamics, and nutrient cycling also provide additional benefits such as habitat restoration and increased carbon sequestration.

To accelerate the adoption of effective nutrient and soil management practices, governments and academic institutions can continue to offer financial incentives and technical assistance to farmers, agriculture landowners, and managers. These programs can promote alternative fertilizer application methods, such as optimized timing and the use of fertilizer additives that slow down the nitrification process and encourage the use of more efficient fertilizers.

According to the USEPA's *Global GHG Emissions and Mitigation Report (2015-2050)*, several technologically feasible nutrient management strategies, including no-till, modified fertilization application rates, nitrification inhibitors, and crop residue integration, can help farmers reduce nitrous oxide emissions.[295] These approaches are considered cost-effective relative to other mitigation options, with the potential to reduce one metric ton of CO_2e for every $100 invested — less than an estimated societal cost of inaction.[296] If these practices were gradually adopted across the region, achieving non-CO_2 (nitrous oxide) reductions of 6 percent in Illinois and 4 percent in both Indiana and Wisconsin by 2035, and maintaining a 4 percent reduction through 2050, agricultural emissions could decline by 24 percent by 2035 and remain at that level through mid-century relative to the current policy scenario (Table 36).[297]

Table 36. Financial incentives for alternative fertilizer application practices

Scenario	Modeled strategy	GHG emissions reduced, MMT CO_2e (% of sector emissions)	
		2035	2050
State and local	Increase the adoption of alternative fertilizer application practices, such as optimized application and nitrification inhibitors, that reduce nitrous oxide emissions at costs below $100/metric ton CO_2e.	0.5 (24%)	0.5 (24%)

Source: CMAP and E3, 2025.

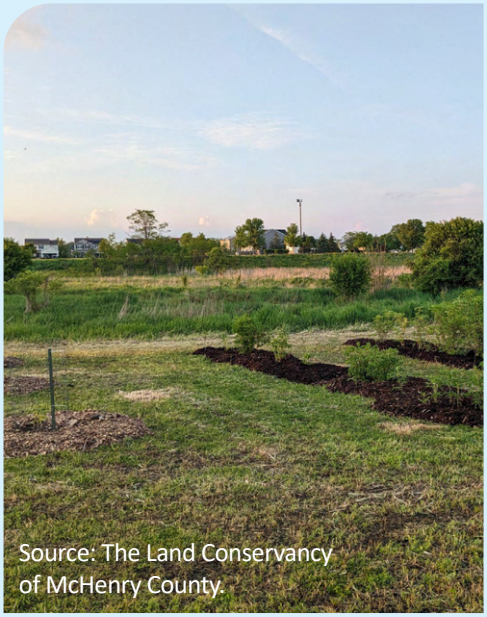
1.1 Enrich agricultural soils to increase soil nutrient-holding capacity

Farm operators can improve soil health and reduce fertilizer needs through soil management practices that help retain nutrients.[298] Key practices include planting cover crops, such as grasses, legumes, and forbs, to prevent bare soil during vulnerable periods when erosion and nutrient loss are more likely. Another effective approach, crop rotation, involves growing crops in a planned sequence on the same field over time.[299] Crop rotation enhances nutrient-holding capacity and increases carbon sequestration, while also reducing pests, improving water quality, and providing feed or forage for livestock. It can also help manage production risks by diversifying crops and balancing labor needs during planting and harvest.[300] To incentivize adoption of these methods, county governments can provide guidance and funding.

1.2 Maximize synthetic fertilizer effectiveness

Farm operators can reduce nitrous oxide emissions and improve soil health by applying fertilizer more efficiently. Benefits include reduced erosion, improved water quality, increased plant productivity, enhanced nutrient cycling, and greater organic matter retention. Effective fertilizer management controls the rate, source, placement, and timing of nutrient application, tailored to soil type and climate.[303] Tools such as soil testing, plant tissue analysis, and nutrient uptake data can guide these decisions, though costs can be a barrier.[304] Governments and research institutions should continue to provide updated guidance, research, and technical assistance to support region-specific practices.[305]

Natural soil amendments, like compost, can increase nutrient-holding capacity and reduce the need for synthetic fertilizer.[306] Adding biochar to compost creates a nutrient-rich, carbon-sequestering soil amendment.[307] These methods work well for small-scale operations, although large-scale compost supply remains a challenge. See the waste chapter for additional details on composting.



Source: The Land Conservancy of McHenry County.

Food forests and low-disturbance practices

The Land Conservancy of McHenry County has cultivated a food forest in Woodstock, Illinois, following indigenous crop rotation and soil restoration techniques.[301] Reducing soil disturbance through careful tillage also improves soil health. Traditional tilling turns soil to prepare for seeding and control for weeds and pests, but frequent or intense tilling can degrade soil. Limiting tillage helps retain organic matter, reducing the need for additional fertilizer and lowers susceptibility to wind and water erosion.[302] No-till practices cause the least disturbance, while low-till methods, though involving some soil turnover, still build soil health over time by increasing plant-available moisture and improving water quality.

Objective 2: Improve manure and feed management

Reducing methane emissions from livestock digestion and manure requires improving animal feed quality, feeding practices, and manure management. Co-benefits include healthier animals, productive pastures, increased biodiversity, and improved nutritional quality of animal products. While financial and market barriers currently limit adoption, these practices can significantly reduce emissions.

Governments and academic institutions can continue to offer financial incentives and technical assistance to farmers, agricultural landowners, and managers to promote the uptake of alternative practices. Based on the USEPA's national cost analysis, there is significant potential for farmers to adopt improved manure and feed management practices that reduce methane emissions at costs below $100 per metric ton of CO_2e reduced, making them relatively cost-effective compared to other mitigation options.[308]

The USEPA's *Global Non-CO_2 Greenhouse Gas Emission Projections and Mitigation Potential, 2015-2050* identifies several technologically feasible livestock and manure management strategies — including improved feed management, bovine supplements, vaccines, and improved grazing practices — that can reduce methane emissions.[309] If gradually adopted across the region — reaching non-CO_2 (methane) reductions of 40 percent in Illinois, 42 percent in Indiana, and 34 percent in Wisconsin by 2035, and maintaining those reductions through 2050 — livestock-related agricultural emissions could decline by 3 percent by 2035 and remain close to that level through 2050 (Table 37). Over the long term, Greater Chicago needs complementary strategies, including shifts in consumption patterns or technological innovations, to further reduce emissions from livestock.

Table 37. Financial incentives for manure and feed management practices

Scenario	Modeled strategy	GHG emissions reduced, MMT CO_2e (% of sector emissions)	
		2035	2050
State and local	Provide financial incentives to increase the adoption of alternative livestock feeding and manure management practices that reduce methane emissions at costs below $100/metric ton CO_2e.	0.1 (3%)	0.1 (3%)

Source: CMAP and E3, 2025.

2.1 Increase the quality of feed in livestock and poultry diets

Improving feed quality directly reduces methane emissions by making digestion more efficient and decreasing the amount of undigested material that ferments in the animal's stomach and manure. Strategies include adjusting concentrate-to-forage ratios, using highly digestible forages or grains, providing dietary additives, and improving pasture management.[310] State-level standards that account for the carbon impact of feed can incentivize climate-smart feed choices and influence the animal feed market.[311]

Managing pastures can also enhance nutrient quality for grazing livestock and reduce overall emissions. Effective approaches include brush and weed control, perennial cover planting, and improved grazing techniques, such as prescribed, rotation, or holistic grazing. Wetland restoration can also help by improving soil water retention and reducing grazing pressure. Coalitions like the Kenosha Regenerative Producers and the Illinois Grazing Lands Coalition provide guidance and technical support to encourage these regenerative techniques.[312] Using these practices can enhance livestock performance, sequester carbon, reduce nutrient runoff, and lower feed costs.[313]

To promote adoption, states and counties must set conservation standards to guide farmers, researchers, and feedstock producers in implementing natural resource-focused strategies that lower emissions from livestock production. Similar to existing sheet, rill, and wind erosion performance standards in Wisconsin, standards should require that all land where crops or feed are grown, including pastures, have an erosion rate less than or equal to the "tolerable" rate.[314]

Financial incentives and technical assistance will help farmers meet those standards. For instance, Wisconsin recently passed legislation to create a Transition to Grazing program, offering grants and technical support to help farmers implement managed grazing systems.[315]

2.2 Improve manure management

Manure management includes how manure is captured, stored, treated, and used.[316] In concentrated animal feeding operations, manure is located in one area, often in tanks or pits in anaerobic conditions, leading to increased emissions and lost opportunity for reuse.

Manure can serve as a natural fertilizer when distributed on pastures, improving soil fertility and forage quality. When manure decomposes in aerobic conditions, it releases fewer emissions. Distribution can be accomplished through the grazing techniques listed in the previous strategy, or through the manual spread of manure onto pastures.

Manure can also be processed in an anaerobic digester to produce biogas, which can then generate electricity. This approach reduces emissions from manure decomposition and offsets those from diesel or natural gas usage. While upfront costs for digester systems are high, energy savings and shared infrastructure can help offset expenses.

To improve manure management, states must continue offering financial incentives like tax cuts and grant programs for biodigesters and continue technical assistance for the application of manure to pastures. In 2023, Wisconsin legislators introduced Assembly Bill 43/Senate Bill 70 to create a grant program supporting regional biodigester installation. Although the bill did not pass, it offers a strong model for future state legislation.[317]

Objective 3: Transition agricultural operations to clean energy

Farm operators can further reduce emissions by transitioning on-farm facilities, equipment, and agricultural operations to run on clean energy sources.[318] Gasoline- and diesel-powered off-road vehicles, such as tractors, utility vehicles, and crop sprayers, should be replaced with electric alternatives, and stationary equipment, such as irrigation pumps, refrigeration, and temperature-controlled storage, can be electrified. Agricultural combustion systems and space, water, and soil heating in greenhouses, nurseries, and livestock housing can also be retrofitted or replaced with electric and heat pump technologies.[319] These upgrades reduce emissions while improving efficiency with modern technology.

The long-term energy efficiency savings and air quality benefits to farm workers could be significant, but the installation costs of the technology and equipment are a barrier. States and counties should provide financial incentives and technical assistance to support adoption. Indiana's 2025 Dieselwise Emission Reduction Program offers a model, providing funding for projects that significantly reduce emissions from on-road and off-road vehicles and equipment, including agricultural equipment.[320] The California Air Resources Board's Funding Agricultural Replacement Measures for Emissions Reductions Program also offers a model that is focused on agricultural equipment and operations.[321]

11

Natural carbon sequestration

About this chapter

This chapter outlines natural carbon sequestration's role in achieving the region's reduction targets, including current conditions, modeled scenarios, and key objectives and strategies. It shows how coordinated action across state, local, federal, and private partners can result in as much a 75 percent increase in natural carbon sequestration by 2050, with select measures quantified to show the scale and pace of change required.

Natural carbon sequestration objectives and strategies

1. Protect, connect, and restore natural lands

1.1. Strengthen conservation and restoration funding

1.2. Align development practices with conservation

1.3. Strengthen wetland protections

1.4. Expand the urban tree canopy

2. Enhance carbon storage and resilience on agricultural lands

2.1. Promote climate-smart farming and grazing practices

2.2. Protect farmland and align renewable energy development

Protecting and restoring natural systems must occur with urgency and at a scale that matches the region's climate and biodiversity challenges. Natural carbon sequestration is a vital complement to direct emission reductions. Forests, prairies, oak savannas, wetlands, urban tree canopies, and well-managed agricultural soils capture and store carbon through photosynthesis and soil formation. While this plan's primary focus is reducing gross emissions, maximizing the capacity of natural and agricultural lands to absorb and retain carbon strengthens both climate mitigation and resilience.

Trees and wetlands provide critical carbon sinks and broader resilience benefits

In 2020, the region's natural assets captured roughly 2 percent of emissions (2.74 MMT CO_2e). Trees and wetlands account for 91 percent of this sequestration, while cropland conservation and land use changes contribute to the remainder. Although prairies were not quantified in the 2020 inventory, the Chicago Wilderness region contains an estimated 33,000 acres of prairie and grassland remnants (Figure 36). These ecosystems store substantial carbon in deep root systems and soils, particularly in native tallgrass areas.[322] Beyond carbon storage, these systems improve air and water quality, mitigate the urban heat island effect, reduce energy use, and help communities against climate impacts.[323]

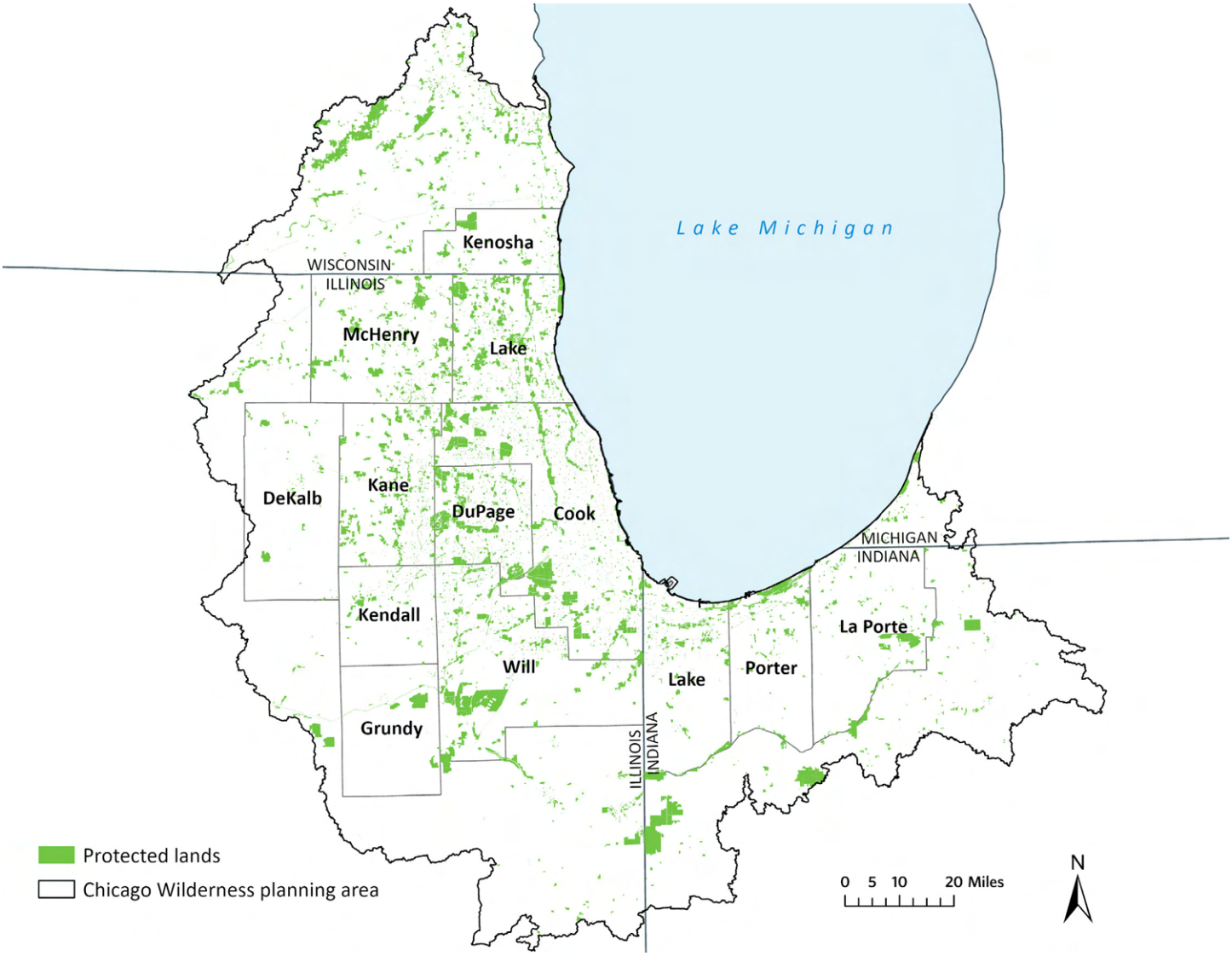
Development pressures have led to declines

From 2005 to 2020, regional sequestration declined by 23 percent, from 3.57 to 2.74 MMT CO_2e, as low-density residential development converted forests, grasslands, wetlands, and farmlands to built uses. Fragmented or degraded habitats store less carbon and are less resilient to climate stressors such as drought, flooding, and invasive species. Ongoing land conversion and ecosystem stress threaten the region's ability to sustain current carbon sinks, underscoring the need for restoration and protection.

Conservation practices are critical

Promoting healthy, connected, and biodiverse ecosystems is essential for maximizing sequestration. Strategies such as compact, infill development can reduce pressure on natural and agricultural lands, while targeted restoration, conservation easements, and sustainable land management practices can preserve and expand carbon storage. Protecting these lands not only supports climate goals but also strengthens ecosystem resilience, enhances biodiversity, and maintains community benefits such as cooling, flood protection, and recreation.

Figure 36. Public and private protected natural areas, 2023



Source: Chicago Wilderness, 2023.

Reaching the 2050 target

Natural carbon sequestration has the potential to increase by as much as 75 percent above 2005 levels by 2050. While sequestration cannot replace direct emissions reductions, enhancing the ability of natural and agricultural lands to capture and store carbon is essential.

Current policy scenario

If no new policies are adopted, sequestration levels are projected to remain relatively stable, but climate change will likely diminish this capacity over time as ecosystems face heat stress, drought, and biodiversity loss — highlighting the risk of losing these key assets (Figure 37).[325]

Plan implementation scenario

While federal programs can support progress, enhancing carbon sequestration depends on state and local leadership to conserve, connect, and restore land and advance soil management practices. Under the plan implementation scenario, the region achieves a 75 percent increase in sequestration by advancing two objectives:

1. Protect, connect, and restore natural lands.
2. Enhance carbon storage and resilience on agricultural lands.

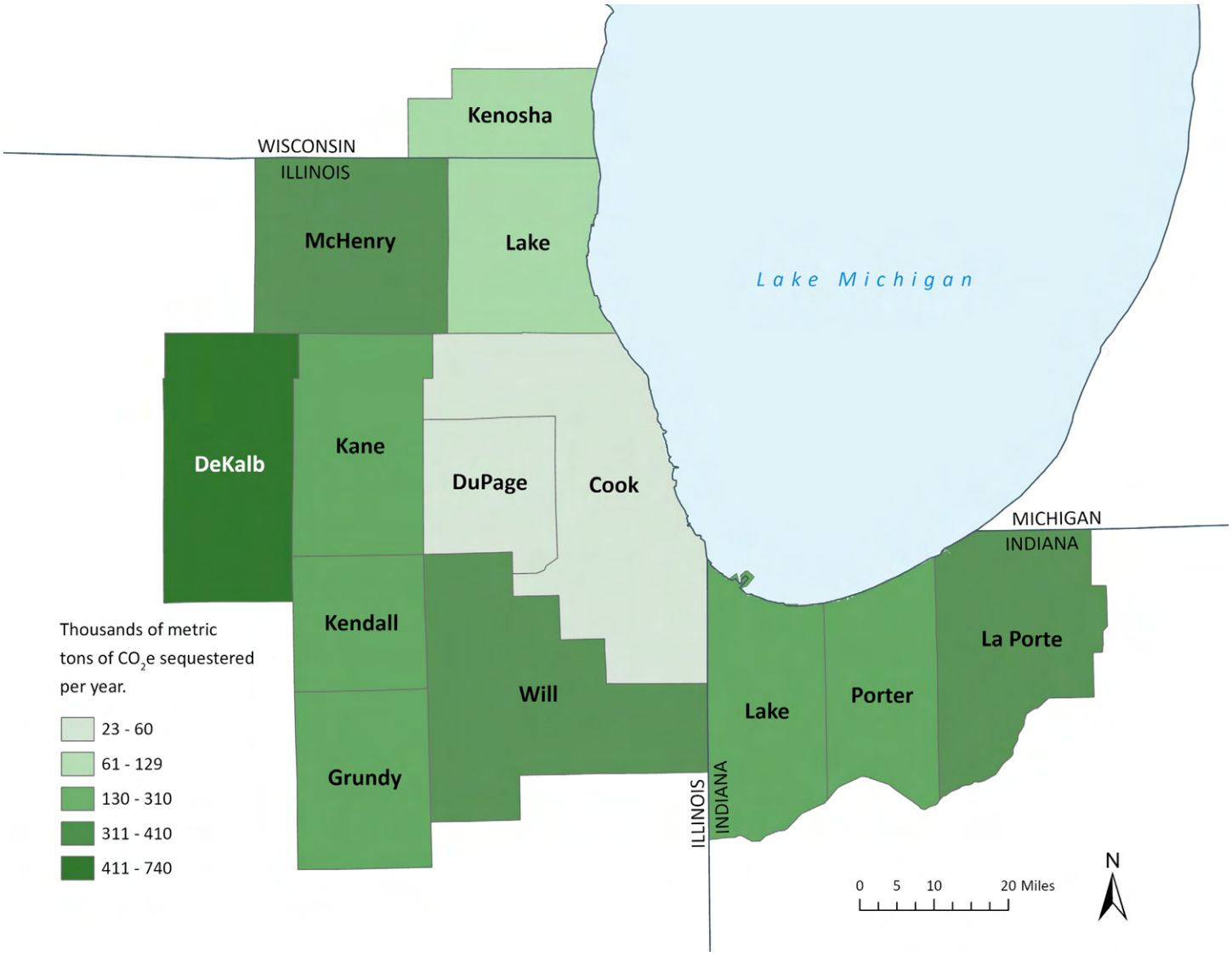
Modeling using Naturebase, a peer-reviewed data platform developed by The Nature Conservancy and its partners, evaluates nine high-impact actions across forests, wetlands, grasslands, and croplands. Results show the region could increase sequestration by 1.4 MMT CO_2e by 2035 and 3.4 MMT CO_2e by 2050 relative to the current policy scenario (Figure 37 and Table 38).[326] The largest gains come from cropland soil carbon and agroforestry, together capturing nearly 3 MMT of CO_2e annually by mid-century, equivalent to restoring 3.4 million acres of cropland and forested areas.[327]

State and local role

Achieving this potential will require sustained investment in land protection, restoration, and management, backed by technical assistance and strong policy incentives. These strategies are highly cost-effective, reducing one metric ton of CO_2e for roughly $100 spent, below the estimated societal cost of inaction. Reaching the regional target will require $442 million through 2050, with annual investment increasing from $1 million in 2026 to $34 million by 2050.[328]

The region's long history of land conservation and restoration, collaboration among states, local governments, and conservation partners can expand natural carbon storage, improve air and water quality, increase access to open space, and enhance resilience to climate impacts. The following objectives and strategies outline specific actions needed to deliver these outcomes. Find details on modeled strategies in Appendix D.

Figure 37. Carbon sequestration potential for forests, wetlands, grasslands, and croplands based on nine high-impact actions in Naturebase



Source: The Nature Conservancy, Naturebase, 2025.

Table 38. Increase the carbon storage potential of the region's natural and working lands

Scenario	Modeled strategy	GHG emissions reduced from current policy scenario, MMT CO_2e (%)	
		2035	2050
State and local	Achieve the technical potential for increased natural carbon sinks through required protection, restoration, and management activities and/or conversion of natural lands (e.g., forest, wetlands, grasslands) and working lands (e.g., agricultural and grazing lands) in Greater Chicago by 2050.	1.4 (50%)	3.4 (124%)

Source: CMAP and E3, 2025.

Objective 1: Protect, connect, and restore natural lands

Protecting and expanding natural lands is essential to increasing carbon sequestration and strengthening ecosystem resilience. Federal and state governments play a critical role in funding land acquisition as well as enacting regulations to protect wetlands. Local governments, such as county forest preserves and conservation districts, as well as land trusts, are central to maintaining, connecting, and protecting existing lands, increasing the urban tree canopy, and expanding natural areas — particularly forest, prairie, and wetlands, which together contribute the greatest share of regional sequestration. Beyond climate benefits, these actions improve air quality, provide cooling, enhance property values, and support recreation and mental well-being.

Existing natural lands, whether permanently protected or not, are increasingly stressed by fragmentation, invasive species, stormwater runoff, and climate impacts such as heat waves, droughts, and flooding. These pressures reduce the land's capacity to store and sequester carbon. Maintaining and improving ecosystem health will be essential to sustain and enhance future carbon sequestration potential.[329]

Restoration efforts should recognize pre-settlement conditions, historical and current land use, and anticipate climate change impacts. Before development, much of the region was covered in oak savannas, prairies, and, to a limited extent, forests. Some research suggests that grasslands and prairies can be more effective at storing carbon than establishing new trees in regions that do not historically support forests.[330] However, in highly developed landscapes, increasing the tree canopy is more practical.

1.1 Strengthen conservation and restoration funding

While the region already contains a substantial amount of protected natural lands, it represents only a fraction of what is needed to sustain ecosystem health. The Chicago Wilderness Alliance, a coalition advancing conservation across a 7-million-acre area spanning northeast Illinois, northwest Indiana, southwest Michigan, and southeastern Wisconsin, has identified 578,000 acres, or 7.3 percent of its 4-state region, as permanently protected. It aims to conserve an additional 270,000 acres by 2030 as part of the global 30x30 initiative.[331]

The alliance's Green Vision Hub land protection map helps land managers identify opportunities to build on already protected landscapes and connect fragmented habitat corridors through targeted acquisitions and restoration.[332] While this dataset is a useful reference, a comprehensive needs assessment would help quantify the full potential of land preservation and stewardship to support GHG reduction goals.

Meeting regional conservation and restoration goals will require stable, long-term funding and coordination across levels of government. Local referenda have proven effective: the Cook County Forest Preserves' 2022 Clear Air, Clean Water, and Wildlife Habitat Protection measure created dedicated revenue to acquire and restore natural lands and expand community access, and several other counties experienced similar success in 2024.[333]

Illinois can strengthen conservation outcomes by increasing and stabilizing funding for land protection and stewardship. Dedicated and reliable funding streams, through both existing and new budgetary and statutory mechanisms, are essential to support programs, partnerships, and financing tools that enable land acquisition and long-term management.

Programs such as Illinois' Open Space Lands Acquisition Development Program and Natural Areas Acquisition Fund are key tools in expanding parks, natural areas, and carbon-sequestering landscapes. The Open Space Lands Acquisition Development Program provides grants to local government to acquire and develop public parks and open space. The Natural Areas Acquisition Fund supports land acquisition by the Illinois Department of Natural Resources and enables land trusts to conduct stewardship through the Illinois Natural Areas Stewardship Grant Program.[334] Ensuring that these programs have consistent, sufficient, and protected funding will help communities meet climate and conservation goals and expand access to high-quality natural areas.

Federal agencies also have a role in supporting these successes through programs such as the Land and Water Conservation Fund, National Fish and Wildlife Foundation's America's Ecosystem Restoration Initiative, state coastal management programs, and the Great Lakes Restoration Initiative. The Land and Water Conservation Fund helps protect and expand access to national parks, forests, and other public lands, while funding state grants to create and improve parks and recreation areas.[335] The National Fish and Wildlife Foundation partners with the U.S. Department of Agriculture and U.S. Department of the Interior to bring public and private funding to support multijurisdictional projects in conserving, reconnecting, and expanding ecosystems.[336] The Hackmatack National Wildlife Refuge, Indiana Dunes National Park, and Midewin National Tallgrass Prairie serve as a testament to the type of land protection that can be accomplished through federal support, as well as strong partnerships and coordination with state and nongovernmental organizations.

Beyond public ownership, voluntary conservation easements offer a flexible, permanent tool for protecting and restoring lands in private hands.[337] Broader incentives, cost-sharing, and technical assistance, which can be offered at all levels of government, can help landowners reestablish native vegetation, improve soil health, and enhance ecosystem services. Innovative financing — such as regional conservation funds, public-private partnerships, or carbon and water-quality credit markets — can further expand restoration capacity.[338] Coordinated, well-funded conservation will ensure the region's forests, prairies, and wetlands continue to store carbon, reduce flooding, and sustain biodiversity for decades to come.

Source: Forest Preserves of Cook County.

Expanding native seed supply in Cook County

The Forest Preserves of Cook County, in partnership with the Chicago Botanic Garden, are expanding native seed collection, propagation, and distribution to support large-scale ecological restoration across the preserves. Building on decades of collaboration, the Seed Amplification Program significantly increases local seed supply, ensuring that restoration projects use regionally appropriate species that support pollinators, wildlife habitats, and soil health.

In 2024, Forest Preserves staff and volunteers constructed 65 raised seed beds at the Salt Creek Landscape Maintenance Facility and collected 59 pounds of seed from 65 different native species. The program also funded new staff at the Chicago Botanic Garden who are dedicated to seed amplification, banking, and propagation. As a result, nearly 14,000 native plant plugs from more than 20 species were planted in new seed beds and wild seed gardens in 2025, strengthening restoration efforts at sites such as Marley Creek and Salt Creek.[339]

1.2 Align development practices with conservation

In addition to acquiring and protecting natural lands, land use planning and development practices can play a critical role in reducing development pressure on the region's remaining natural and agricultural landscapes. Promoting compact and infill development, integrating conservation design, and strengthening wetland protections are essential strategies for maintaining and expanding the region's carbon sequestration capacity while supporting climate resilience and sustainable growth.

As communities grow, comprehensive land use plans should direct new development toward existing built-up areas and use conservation mapping tools, such as the Chicago Wilderness Alliance's Best of What's Left analysis, to identify lands that should remain undeveloped. County and municipal subdivision and zoning ordinances can embed these conservation goals by incorporating flexible site design standards, open space set-asides, and natural resource protections. Conservation organizations can assist in this work; for example,

the Seno Kenosha/Racine Land Trust Conservancy in Wisconsin helps communities adopt ordinances requiring 40 to 65 percent of development sites to remain in natural cover. Supporting compact growth in existing neighborhoods and downtowns allows communities to meet housing and economic goals while preserving key landscapes and the ecosystems services they provide. Related strategies for infill development are detailed in the buildings chapter.

1.3 Strengthen wetland protections

Wetland conversion and drainage for development continue to threaten ecosystem health, water quality, and the region's capacity to store carbon. Wetlands hold a disproportionate share of the world's soil carbon due to their unique, low-oxygen conditions that slow the decomposition of organic matter.[342]

Recognizing the valuable services wetlands provide, the Clean Water Act historically treated wetlands as "waters of the United States," requiring permits for activities such as dredging and filling. However, the 2023 Supreme Court decision in Sackett v. EPA significantly narrowed federal protection to cover only wetlands with a continuous surface connection to a navigable waterway.[343] In Illinois, this ruling left approximately 72 percent of the state's wetlands outside Clean Water Act jurisdiction, meaning they are no longer federally protected.[344]

Illinois has recently explored legislation to extend state-level protections to these critical ecosystems.[345] By contrast, Wisconsin maintains robust state wetland permitting requirements under Wis. Stat. § 281.36 and NR 103, which require that projects avoid, minimize, or mitigate impacts.[346] Indiana also regulates "state-regulated wetlands" under IC 13-18-22, though amendments in 2021 reduced protections for certain isolated wetlands.[347]

At the local level, county and municipal governments can strengthen protections through zoning, floodplain, and stormwater ordinances that restrict wetland conversion and promote restoration or buffer zones. Expanding state water quality standards or redefining "state waters" to explicitly include wetlands could further enhance regulatory consistency and protection. Together, these actions help maintain the carbon sequestration, flood storage, and biodiversity benefits that wetlands provide to the region.

1.4 Expand the urban tree canopy

Expanding and maintaining the region's tree canopy is among the most cost-effective strategies for advancing both climate mitigation and resilience. A healthy, dense canopy sequesters carbon, reduces the urban heat island effect, improves air and water quality, and provides much-needed shade for residents. Properly placed trees can also lower household energy use by up to 25 percent.[348]

Recognizing trees as critical infrastructure and funding them accordingly is key to realizing these multiple benefits. This includes not only funding for tree purchase and maintenance, but also the infrastructure improvements needed to create suitable street tree locations — such as redesigning sidewalks, curbs, and utility corridors to accommodate long-term growth. In the built environment, increasing soil volume and rooting space is critical to support larger, healthier trees and extend their lifespan. Municipalities should include urban forestry in long-term plans and adopt canopy goals, like the Morton Arboretum's Chicago Region Tree Initiative goal to increase tree canopy cover to 22 percent by 2050.[349]

Expansion of tree canopy must be a regional priority. Historically disinvested and low-canopy areas require targeted funding, technical assistance, and training to ensure long-term success. Programs like Openlands' TreePlanters Grant program demonstrate how local partnerships can build capacity by pairing planting funds with education on care and maintenance during the first three years of a tree's life.[350] Community engagement and stewardship programs, such as Openlands' TreeKeepers and municipal tree ambassador programs, can further strengthen long-term care and build local ownership.

Integrating canopy goals into street design and development standards can help communities grow smarter and cooler while improving quality of life. Equally important is the protection and active management of existing trees to ensure these benefits endure. Municipalities can strengthen ordinances to discourage unnecessary tree removal and incentivize preservation during development.[351] To build resilience against pests, disease, and climate change, local governments and partners should follow biodiversity standards such as the "5-10-15" guideline, encouraging no more than 5 percent of any species, 10 percent of a genus, or 15 percent of a family is planted.[352] This ensures a diverse mix of climate adaptive species. In addition, local governments should prioritize structural pruning and tree establishment practices that improve survival rates and long-term canopy health.

Ongoing monitoring, pest management, and maintenance funding are essential to sustain canopy health. Shared-service models that coordinate maintenance across multiple municipalities can reduce the financial burden on individual communities while ensuring consistent canopy care and resilience at a regional scale. With coordinated action and sustained investment, trees can serve as a cornerstone of regional climate action and fair community development.

Objective 2: Enhance carbon storage and resilience on agricultural lands

Working lands have significant untapped potential to act as carbon sinks, capturing and storing carbon in plants and soils while supporting the region's agricultural economy. Because croplands and pastures cover most of the region's land area, even modest improvements in soil carbon can yield large regional benefits — offsetting emissions, enhancing soil fertility, and improving water retention. Practices that build soil carbon also strengthen farm resilience to drought and flooding and can lower input costs, creating both environmental and economic gains.

2.1 Promote climate-smart farming and grazing practices

Federal and state governments can help farmers improve soil health and increase carbon storage by promoting regenerative practices, such as crop rotation, cover cropping, reduced tillage, and the use of organic soil amendments. On grazing lands, rotational grazing, brush management, and manure management can further enhance soil carbon while protecting water quality.

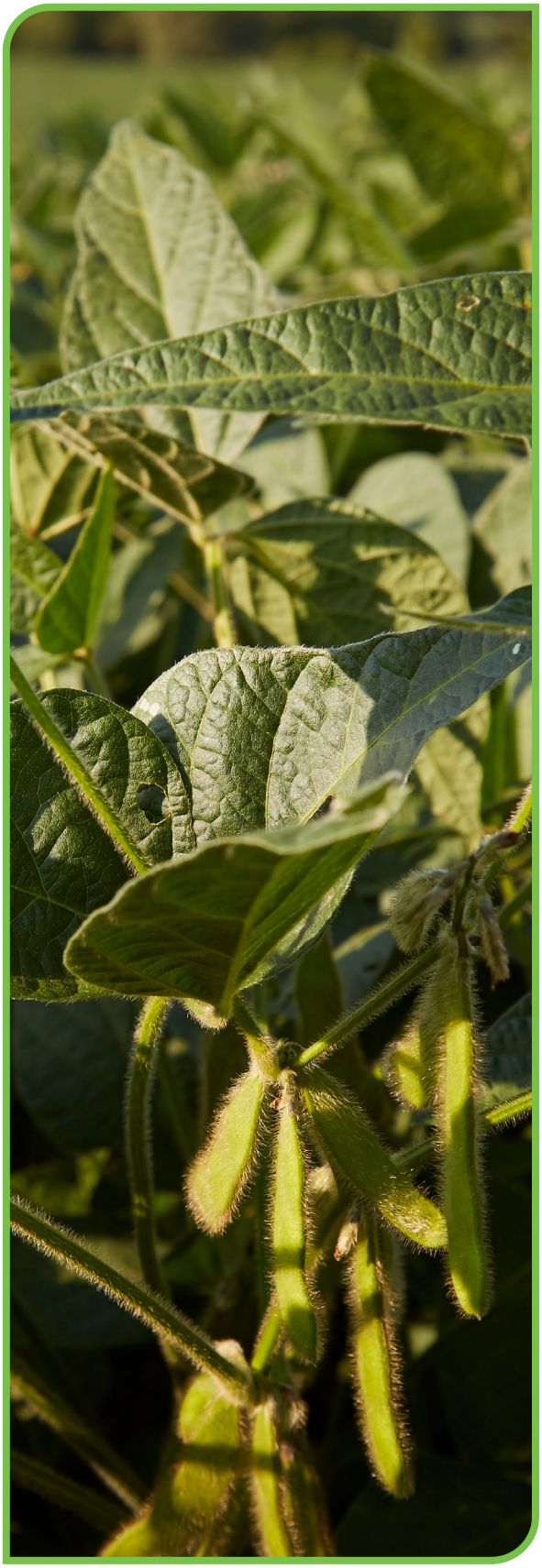
Financial and technical assistance can accelerate adoption and make these practices accessible to farms of all sizes.[353] For example, the U.S. Department of Agriculture's (USDA) Climate-Smart Commodities program funds pilot projects using climate-smart agriculture practices. Although currently paused, it provided more than

60,000 farms with financial and technical assistance to promote climate-smart commodities and production practices, thereby expanding these markets and reducing agricultural GHG emissions.[354] The Natural Resource Conservation Service's Environmental Quality Incentives Program provides technical assistance and a cost-share program to help landowners implement conservation practices. It works with agricultural producers to develop individualized conservation plans to address nutrient application, run-off, and increase carbon sequestration.[355]

The USDA's Agricultural Conservation Easement Program (ACEP) is another federal program that supports climate smart farming. The ACEP offers two types of easements — agricultural land easements that help landowners protect cropland and grasslands on working farms and ranches or wetland reserve easements that take low producing wetlands out of production and restoring them as wetlands.[356]

Local programs, such as those offered through local soil and water conservation districts — like Porter County Soil and Water Conservation District's cover crop cost-share program — can help increase adoption as well.[357] Elements of these programs, along with practices like invasive species management, erosion control, and habitat restoration, can be adopted by state governments to continue long-term stewardship support and sustain these gains over time. See strategies identified in the agriculture chapter for more information.

Other programs, like statewide conservation reserve enhancement programs (CREPs), can help landowners take a comprehensive approach to climate-smart practices while also addressing erosion, water quality, and water conservation concerns. Indiana's CREP has expanded statewide, with a goal of enrolling 100,000 acres of cropland and marginal pasture into buffer and wetland restoration; protecting watercourses; reducing sediment, phosphorus, and nitrogen runoff; and restoring floodplain and riparian areas. Illinois also has made goals under its CREP, including reducing sediment and nutrient loads in key watersheds and increasing populations of avian species of conservation concern on lands enrolled in CREP.



2.2 Protect farmland and align renewable energy development

Preserving agricultural land from development helps maintain its carbon storage potential and prevents significant soil carbon loss from disturbance and excavation. While global markets, federal policy, and demographic shifts — such as farm consolidation and the retirement of older farmers — shape the amount of land that remains in production, state and local governments still play a critical role in protection. Tools such as conservation easements, purchase of development rights, and zoning protections can safeguard prime farmland while aligning with broader compact growth goals.[358] Integrating farmland protection into comprehensive and regional plans ensures that working landscapes continue contributing to climate resilience, local food systems, and the long-term viability of the region's agricultural economy.[359]

At the same time, the growing demand for renewable energy has led to increased conversion of agricultural lands for solar installations.[360] Some states are responding with limits to protect farmland, but dual-use approaches like agrivoltaics — which combine energy generation with crop or livestock production — offer a promising alternative. Research led by the University of Illinois Extension's SCAPES project demonstrates that adjustable solar panels can allow farm operations to continue between rows, reducing water use and creating new revenue streams for farmers.[361] Illinois' Clean and Reliable Grid Affordability Act includes new requirements to guide renewable energy development on agricultural land.

Energy facilities built on farmland must now prepare and implement a drainage plan outlining how surface and subsurface drainage systems will be protected, restored, and maintained during and after construction. State and local governments should explore policy frameworks like these that encourage win-win solutions, balancing the need for renewable energy expansion with protection of the region's agricultural and natural lands.[362]

Glossary

Adaptation: Actions that prepare communities and systems to withstand and recover from the impacts of climate change, such as extreme heat, flooding, or drought. This plan focuses on mitigation, not adaptation.

Advanced Clean Cars II (ACC II): California's vehicle standards that require an increasing share of new cars sold to be zero-emission through 2035. States may adopt these standards through the federal Clean Air Act.

Advanced Clean Trucks (ACT): California's vehicle standards that require manufacturers to sell an increasing share of zero-emission medium- and heavy-duty trucks.

Anaerobic digester: A system that breaks down organic materials — such as food waste, manure, or wastewater sludge — without oxygen to produce renewable biogas (mainly methane) and nutrient-rich solids. Anaerobic digestion reduces landfill waste and methane emissions while generating energy.

Baseline year: A reference year used to measure progress toward greenhouse gas reduction targets. The CCAP uses 2005 as the baseline year.

Baseload power: The minimum level of electricity demand on the grid over a period of time, typically supplied by continuously operating plants such as nuclear or natural gas facilities.

Battery storage: Technology that stores electricity for later use, helping balance supply and demand on the grid.

Benchmarking: Tracking and comparing a building's energy or water use against a standard or peers to identify opportunities for improvement.

Biodiesel: A renewable fuel made from vegetable oils, animal fats, or recycled cooking grease that can replace or blend with conventional diesel. Biodiesel can reduce lifecycle greenhouse gas emissions and air pollution from vehicles and equipment.

Bioswale: A shallow, vegetated channel that slows and filters stormwater runoff.

Building electrification: The process of replacing fossil fuel-based systems — such as gas furnaces and water heaters — with efficient electric systems powered by clean energy.

Building performance standard (BPS): A policy that sets energy or emissions performance targets for existing buildings and requires owners to meet them over time.

Carbon budget: The total cumulative amount of carbon dioxide that can be emitted while still meeting a specific temperature or emissions target.

Carbon capture and storage (CCS): A technology that captures carbon dioxide emissions from power plants or industrial sources and stores them underground in deep rock formations or uses them in products like concrete. CCS can help reduce emissions from hard-to-decarbonize sectors.

Carbon dioxide equivalent (CO_2e): A metric that expresses the global warming potential of different greenhouse gases (e.g., methane, nitrous oxide) in terms of the amount of carbon dioxide that would have the same impact.

Carbon sequestration: Capturing and storing carbon dioxide in trees, soil, wetlands, or other natural systems.

Carbon storage potential: The estimated capacity of natural ecosystems or engineered systems to capture and retain carbon over time. This includes biological sequestration in forests, soils, and wetlands, as well as geologic or technological storage, and is typically expressed in metric tons of carbon dioxide equivalent.

Circular economy: An economic system that designs out waste and pollution, keeps materials in use longer, and regenerates natural systems.

Clean Air Act: The federal law first enacted in 1970 that regulates air emissions from stationary and mobile sources to protect public health and the environment. It authorizes the U.S. Environmental Protection Agency (USEPA) to establish air quality standards and regulate pollutants, including greenhouse gases under the endangerment finding.

Clean electricity standard (CES): A state or federal policy requiring utilities to supply a certain share of power from low- or zero-carbon sources.

Clean Energy and Equitable Jobs Act (CEJA): Illinois' landmark clean energy law, adopted in 2021, that sets a goal for 100 percent clean energy by 2050. CEJA expands renewable energy programs, requires electric utilities to plan for distributed generation, phases out fossil-fuel power plants, and establishes workforce programs to support communities affected by the energy transition.

Clean and Reliable Grid Act: Illinois' comprehensive energy legislation adopted in 2025. The law expands incentives for energy storage, authorizes new geothermal and nuclear development, and sets statewide permitting standards for wind and solar projects that limit local restrictions. It also launches pilot programs for thermal energy networks and advances planning for a more reliable, resilient electric grid.

Clean heat standard: A policy that requires natural gas utilities to gradually lower the carbon intensity of the fuels they sell by investing in energy efficiency, renewable heating, or electrification.

Climate mitigation: Efforts to limit or prevent greenhouse gas emissions and reduce the severity of climate change.

Co-benefits: Additional advantages — such as cleaner air, improved health, or new jobs — achieved while reducing emissions.

Comprehensive Climate Action Plan (CCAP): A regional strategy developed by the Chicago Metropolitan Agency for Planning, Metropolitan Mayors' Caucus, and Northwest Indiana Regional Planning Commission to reduce greenhouse gas emissions across 13 counties in Illinois, Indiana, and Wisconsin.

Composting: A controlled process that converts organic waste — such as food scraps or yard trimmings — into nutrient-rich soil amendments while reducing methane emissions from landfills.

Corporate average fuel economy (CAFE) standards: Federal regulations administered by the U.S. Department of Transportation's National Highway Traffic Safety Administration that set average fuel efficiency requirements for cars and light trucks sold in the United States. Automakers must improve fleetwide miles per gallon each year to meet these standards, which are designed to reduce fuel consumption and emissions.

Cover crop: A plant grown primarily to protect and improve soil health between periods of regular crop production.

Criteria pollutants: Air pollutants regulated under the federal Clean Air Act, such as ozone and fine particulate matter, that harm health and the environment.

Decarbonization: Reducing or eliminating carbon emissions from energy, transportation, buildings, and industry.

Distributed energy resources (DERs): Small-scale, local energy systems such as rooftop solar, battery storage, and electric vehicles that generate or store power close to where it is used.

Drayage truck: A heavy-duty truck used to move goods short distances, such as between ports, rail yards, and warehouses — a significant source of diesel emissions in freight corridors.

Electric vehicles (EVs): A vehicle powered entirely or partly by electricity stored in a battery, rather than gasoline or diesel. EVs produce no tailpipe emissions and can be charged at home, work, or public stations.

Electric- or EV-ready: A building or parking facility that includes the electrical infrastructure — such as wiring, conduit, and panel capacity — needed to install electric vehicle charging equipment in the future. EV-ready design lowers future retrofit costs and supports wider EV adoption.

Electrification: Replacing technologies that burn fossil fuels — such as gas furnaces or gasoline vehicles — with electric alternatives.

Endangerment finding: A determination by the USEPA that greenhouse gases pose a threat to public health and welfare. Issued in 2009 under the Clean Air Act, this finding provides the legal basis for the USEPA to regulate carbon dioxide and other GHG emissions from vehicles, power plants, and industrial sources.

Emission factor: A coefficient that quantifies the amount of a pollutant released per unit of activity, such as kilograms of carbon dioxide per gallon of gasoline burned.

Energy efficiency: Using less energy to provide the same service, such as lighting, heating, or manufacturing.

ENERGY STAR: A voluntary USEPA program that sets energy-efficiency specifications for products, buildings, and homes. ENERGY STAR-certified equipment meets or exceeds performance criteria that reduce energy use and operating costs compared to baseline technologies.

Energy transition: The global shift from fossil fuels to renewable, low-carbon energy sources.

Fleet electrification: The process of converting groups of vehicles — such as delivery vans, transit buses, or government fleets — from fossil fuels to electric power.

Geothermal energy: A renewable energy source that uses heat from beneath the Earth's surface to produce electricity or provide heating and cooling through ground-source heat pumps. Geothermal systems can serve single buildings or entire neighborhoods through shared thermal networks.

Green Infrastructure: Natural or engineered systems — like rain gardens, permeable pavements, and wetlands — that manage stormwater and improve water quality while providing habitat and recreation benefits.

Greenhouse gases (GHGs): Gases that trap heat in the atmosphere and contribute to climate change. The main GHGs are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O).

Grid modernization: Upgrading the electric grid with digital controls, sensors, and flexible infrastructure to handle renewable energy, storage, and two-way power flows.

Groundwater: Water stored below the earth's surface in soil or rock formations, often used for drinking water.

Heat pump: An efficient electric system that provides heating and cooling by transferring heat between indoor and outdoor air or ground sources.

Indirect Source Rule: A regulation that limits emissions from facilities that generate large volumes of vehicle traffic, such as warehouses, ports, or distribution centers.

Industrial processes: Manufacturing and chemical processes that release greenhouse gases as part of production, such as steelmaking or cement manufacturing.

Inflation Reduction Act (IRA): Federal legislation enacted in 2022 that represents large investment in climate and clean energy. The IRA provides tax credits, rebates, and incentives for renewable energy, electric vehicles, energy efficiency, and manufacturing of clean technologies.

Interconnection: The process of connecting distributed energy systems (like rooftop solar) to the electric grid, including technical reviews, permitting, and approval by the utility.

Intermodal facility: A site where goods are transferred between different transportation modes, such as rail to truck, or ship to rail.

Landfill gas: Methane and other gases produced by decomposing waste in landfills.

Lifecycle emissions: The total greenhouse gas emissions associated with a product or activity from production to disposal.

Light-duty vehicle: A passenger car, sport utility vehicle (SUV), or small pickup truck designed primarily for personal use and weighing less than 10,000 pounds.

Load management (demand response): Programs or technologies that adjust electricity use during peak periods to balance supply and demand and reduce strain on the grid.

Medium- and heavy-duty vehicle: A truck or bus that carries freight or passengers, often powered by diesel engines, and a major source of air pollution and greenhouse gas emissions.

Methane capture: The process of collecting methane emissions from sources such as landfills, wastewater treatment plants, or manure storage to prevent release into the atmosphere.

Microgrid: A localized energy network that can operate independently from the larger grid, often using renewable energy and storage to provide reliable power.

Mixed-use development: Neighborhoods or buildings that combine housing, retail, and office uses to reduce driving and create vibrant communities.

Modeled strategy: A modeled policy or program that estimates how emissions may change based on specific policies and strategies.

Net-zero emissions: A balance between the amount of greenhouse gases released and the amount removed from the atmosphere.

Net-zero energy building: A building that produces as much renewable energy as it consumes over the course of a year.

Nonpoint source pollution: Pollution that comes from many diffuse sources — such as fertilizers, oil, or pesticides — carried into waterways by rain or snowmelt.

Offsets: Reductions or removals of greenhouse gas emissions from outside a project boundary used to compensate for emissions that remain.

Pathways model: An economywide model developed by Environmental and Environmental Economics, Inc (E3) to estimate greenhouse gas emissions and the impacts of mitigation strategies through 2050.

Permeable pavement: Pavement that allows rainwater to soak through, reducing runoff and flooding.

Power purchase agreement: A long-term contract between an energy buyer (such as a utility or municipality) and a renewable energy developer for the purchase of electricity at a set price.

Prevailing wage: The hourly pay and benefits standard for a given trade in a specific region, often required for publicly funded projects.

Process heat: Thermal energy used in manufacturing processes like smelting, drying, or refining, often generated by burning fossil fuels.

Project labor agreement: A pre-hire agreement between labor unions and employers that sets terms for employment, wages, and benefits on major construction projects.

Regenerative agriculture: Farming practices that restore soil health, increase biodiversity, and capture carbon, including reduced tillage and managed grazing.

Registered apprenticeship: A formal, earn-while-you-learn training program recognized by the U.S. Department of Labor or a state agency that leads to industry credentials.

Renewable energy: Energy from sources that are naturally replenished, such as solar, wind, geothermal, and hydropower.

Renewable portfolio standard: A state-level policy that requires electric utilities to generate or procure a certain percentage of their electricity from renewable sources, such as wind and solar. Illinois' version of this policy, strengthened through CEJA, mandates 100 percent clean energy by 2050.

Resilience: The capacity of systems and communities to prepare for, withstand, and recover from climate impacts.

Renewable natural gas (RNG): RNG is produced by capturing and refining methane from organic waste sources such as landfills, wastewater, and agricultural operations. It can replace fossil natural gas in pipelines and fuel systems, reducing lifecycle emissions.

Soil carbon sequestration: The process of storing carbon in soils through improved land management practices.

SolSmart: A national program that helps local governments remove barriers to solar energy and become "solar-ready."

Thermal energy network: A system that transfers heat through shared underground pipes to provide efficient heating and cooling for multiple buildings.

Time-of-use rate: An electricity pricing structure where costs vary depending on the time of day or season, encouraging customers to shift energy use to off-peak periods.

Trade-exposed industry: An industry that competes in international markets and is sensitive to differences in energy costs or climate policies across countries.

Transit-oriented development: Compact, walkable development centered around public transit stations that reduces driving and emissions.

Vehicle-to-grid: Technology that allows parked electric vehicles to discharge stored electricity back to the grid, supporting reliability and renewable integration.

Vehicle miles traveled (VMT): The total number of miles driven by all vehicles within a region over a specific period.

Waste diversion: Redirecting materials such as recyclables, organics, or construction debris away from landfills through reuse, recycling, or composting.

Water reuse: The process of treating wastewater or stormwater so it can be used again for irrigation, industrial processes, or other uses.

WaterSense: A voluntary USEPA program that labels and promotes water-efficient products and practices.

Weatherization: Home or building improvements that reduce energy loss, such as adding insulation, sealing air leaks, and upgrading windows.

Wetlands: Areas saturated by water that support plants and wildlife adapted to wet conditions, filtering pollutants and storing floodwater.

Whole-home electrification: Converting all major household energy uses — such as heating, water heating, cooking, and clothes drying — from fossil fuels to electricity, often including upgrades to wiring, panels, and appliances like heat pumps and induction stoves.

Zero-emission vehicle (ZEV): A vehicle that produces no tailpipe emissions, such as a battery-electric or hydrogen fuel-cell vehicle.

Endnotes

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12. Compensation for workshop hosts from community-based organizations was made possible through the support of the MacArthur Foundation.
13. Little Village Environmental Justice Organization hosted workshop materials at Fiesta del Sol and collected prioritization feedback at the event.
14. Funding to support gift card incentives was made possible through the support of the MacArthur Foundation.
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Chicago Metropolitan Agency for Planning

The Chicago Metropolitan Agency for Planning (CMAP) is the comprehensive planning organization for the seven counties and 284 communities of northeastern Illinois. The agency and its partners developed and are now implementing ON TO 2050, a long-range plan to help the region implement strategies that address transportation, housing, economic development, open space, the environment, and other quality-of-life issues. Visit cmap.illinois.gov for more information.

Metropolitan Mayors Caucus

The Metropolitan Mayors Caucus is a membership organization of the Chicago region's 275 cities, towns and villages. Founded in 1997, the Caucus pushes past geographical boundaries and local interests to work on public policy issues. The organization provides a forum for metropolitan Chicago's chief elected officials to collaborate on common problems and work toward a common goal of improving the quality of life for the millions of people who call the region home. For more information, visit mayorscaucus.org, and connect with the organization on Facebook, LinkedIn, Instagram, YouTube, and X.

Northwestern Indiana Regional Planning Commission

The Northwestern Indiana Regional Planning Commission (NIRPC) is the official council of northwest Indiana governments, organized under Indiana Code 36-7-7.6t to serve the citizens of Lake, Porter, and LaPorte counties. NIRPC brings communities together to address issues of regional concern related to transportation, the environment, and economic development. Learn more at in.gov/nirpc.