2023

MNDOT SUSTAINABILITY REPORT

DEPARTMENT OF TRANSPORTATION
Sustainability and Public Health

JANUARY 2025

DEPARTMENT OF TRANSPORTATION

Sustainability and Public Health

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This report was prepared by the Minnesota Department of Transportation's Office of Sustainability and Public Health.

Special thanks to Amber Dallman, Carrie Caffrey and Cole Norgaarden for leading the development of this report and to all the MnDOT staff throughout the agency who supported the measures and actions reported in the report.

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Executive Summary

The MnDOT Office of Sustainability and Public Health (OSPH) is pleased to present the 2023 Sustainability Report.

MnDOT can lead the way by demonstrating how sustainable operations look. State leadership in this area could encourage other entities to advance sustainability and public health.

Strategic Alignment

The Minnesota Statewide Multimodal Transportation Plan (SMTP) is the state's highest level policy plan for transportation and lays out goals and strategies for improving the sustainability of the transportation sector. MnDOT's 2023-2027 Strategic Plan outlines specific actions that can advance these goals. Together, both plans reflect MnDOT's vision of creating a safe, equitable and sustainable transportation system.

MnDOT's Office of Sustainability and Public Health (OSPH) leads sustainability and public health planning at MnDOT, but relies heavily on other MnDOT offices, state agencies, external partners and the public to guide sustainable transportation efforts. In 2024, OSPH began a strategic planning process to better align its goals with the SMTP and MnDOT's Strategic Plan.

MnDOT also coordinates with internal and external groups to initiate new relationships, build upon existing ones, and actively seek input on climate policy solutions. Examples include:

- Governor's Climate Change Subcabinet
- Local Agency Vehicle Miles Traveled Workgroup
- MnDOT Resilience Advisory Team

Learn more about collaboration and partnerships later in this report.

How We're Measuring Progress

The 2023 MnDOT Sustainability Report includes information related to our strategic goals to demonstrate sustainability efforts. Each section features a set of metrics that measure progress toward targets, helping MnDOT make decisions and evaluate the effectiveness of policies, strategies and investments.

The sections include planned actions that will make progress on the targets. These actions will be led and/or supported by the OSPH along with other agency partners in 2024 and beyond, with the intent of holding MnDOT accountable by offering transparency to our stakeholders and the public.

2023 in Review

MnDOT remains focused on leading by example consistent with statutory goals for energy and emissions reductions. It recognizes the importance of continued work toward improving safety, advancing public health and supporting climate resilience.

While there is still work to be done, there are several success stories. For example, MnDOT successfully met its energy intensity and water consumption reduction targets at agency facilities. Additionally, MnDOT is only 2% away from meeting our target for reducing greenhouse gas (GHG) emissions at our facilities and just 1% away from meeting our target for renewable energy production and subscription. Each section in the following report gives a detailed look into additional 2023 accomplishments from:

- MnDOT facilities
- MnDOT fleet
- Highway operations
- Roadside vegetation
- Transportation construction projects

The table below summarizes goals and targets. A green circle (●) indicates a goal has been achieved, while a red square (■) indicates results not yet met.

PROGRESS TOWARD MNDOT SUSTAINABILITY TARGETS (2023)

CATEGORY	TARGET	PROGRESS TOWARD TARGET (2023)
GHG emissions of MnDOT facilities	50% emissions reduction from 2005 levels by 2030	48% reduction ■
Energy use intensity of MnDOT facilities	30% intensity reduction from 2008 levels by 2030	34% reduction ●
Renewable energy production and subscription	25% of agency energy needs met by renewable energy production or subscription by 2025	24% of energy needs ■
Water consumption at MnDOT facilities	15% water consumption reduction from 2017 levels by 2030	29% decrease ●
Municipal solid waste (MSW) recycling rate at MnDOT facilities	75% MSW recycling rate achieved by 2030	19% recycling rate ■
GHG emissions of MnDOT vehicle fleet	50% emissions reduction from vehicle fleet from 2005 levels by 2030	18% increase ■
Fleet fossil fuel consumption by MnDOT vehicle fleet	30% reduction in fossil fuel consumption by vehicle fleet from 2017 levels by 2030	18% increase ■
Fuel efficiency of MnDOT light duty vehicle fleet	30 miles per gallon (MPG) average light duty fuel efficiency achieved by 2025	18 MPG ■
Electric vehicles in MnDOT fleet	100% of MnDOT sedans and SUVs converted to zero emission vehicles by 2030	4% transition ■
Salt use on MnDOT roadways	200 gallons of liquid per ton of salt solids applied annually by 2027	85 gallons of liquid per ton of solids applied ■
Native seeding on MnDOT projects	75% of acres on large projects planted with native seeds annually by 2025	48% of acres planted ■
Native planting on MnDOT projects	80% of plants on urban projects annually and 90% of plants on rural projects annually are native plant material	55% of plants on 12 projects evaluated ■

What's Next

MnDOT will continue to integrate sustainability into the way we do business. For more information about MnDOT efforts to advance sustainability and public health within the transportation sector, see the 2023 Transportation System Performance Report.

Introduction

2023 in Context

In 2023, MnDOT worked towards advancing sustainability goals and embraced opportunities for growth despite ongoing challenges posed by climate change. The 2023 calendar year began with an exceptionally snowy winter from January to April. By late spring, the state dried out significantly with periods of intense heat. Extreme drought conditions continued through the summer making it one the driest seasons on record, accompanied by several days of poor air quality from smoke drifting in from Canadian wildfires. December brought record-setting warmth and rainfall, capping the year of extreme weather. These extreme climate conditions limited MnDOT's capacity to make progress toward operational sustainability targets in 2023. Additionally, MnDOT encountered some challenges in sustainable procurement, internal coordination and policy limitations, which at times slowed progress on key initiatives.

MnDOT's Statewide Multimodal Transportation Plan (SMTP) is the agency's 20-year policy plan, which sets goals for sustainability and public health and is integral to overcoming challenges and meeting our goals. These goals are also emphasized in MnDOT's 2023-2027 Strategic Plan. The SMTP and MnDOT's Strategic Plan prioritize addressing climate change, fostering critical connections and promoting healthy, equitable, thriving communities.

Dedicated MnDOT staff are central to driving these efforts forward. Operational efforts include working to electrify our fleet, increasing the use of biodiesel, reducing salt usage on roads and improving energy efficiency at MnDOT facilities. Beyond transportation, MnDOT also supports initiatives that extend to other sectors, such as supporting statewide electrification by using rights-of-ways for transmission lines. In 2023, MnDOT staff developed and oversaw a range of programs and initiatives that reflect a coordinated approach to both policy development and programmatic progress in these areas.

Climate Action

MnDOT oversees the implementation of three federal programs created by the Infrastructure Investment and Jobs Act (IIJA) of 2021:

- **National Electric Vehicle Infrastructure (NEVI) formula program:** Provides funds to states to build a convenient, affordable, reliable and equitable fast charging network for electric vehicles (EVs) across the country. Over five years, Minnesota expects to receive and invest about $68 million from the NEVI formula program.
- **Carbon Reduction Program (CRP):** Provides funding for projects that reduce carbon dioxide emissions from on-road highway sources. Over five years of the IIJA, Minnesota expects to receive and invest about $105 million from the CRP. The CRP also requires states to develop a Carbon Reduction Strategy.
- **Promoting Resilient Operations for Transformative Efficient and Cost-saving Transportation (PROTECT) formula program:** Provides funding for projects that make the surface transportation system more resilient to the worsening impacts of climate change. Over five years, Minnesota expects to receive and invest about $121 million from the PROTECT formula program.

Critical Connections

As outlined in State statute and the SMTP, MnDOT must maintain and improve multimodal transportation connections that are essential for Minnesota's prosperity and quality of life. This includes promoting high-occupancy and low-emission travel options like transit, biking and walking. This helps reduce greenhouse gas emissions and create healthier communities by improving air quality, supporting physical activity and reducing climate change impacts. MnDOT strategically considers new connections that help meet performance targets and maximizes social, economic and environmental benefits.

In 2023, MnDOT advanced accessibility, equity and safety by improving travel options such as more traditional fixed-route transit, biking, and walking, as well as innovative on-demand transit routing and shared mobility. MnDOT also continued to incorporate multimodal infrastructure in our projects across the state. Due to new and increased investments from the State legislature, MnDOT launched a new Active Transportation program, grew the Shared Mobility Program, expanded Safe Routes to School programming and strengthened ongoing implementation of the Complete Streets policy. Additionally, MnDOT partnered with the Wisconsin and Illinois Departments of Transportation and Amtrak to add a daily passenger rail route from St. Paul to Chicago. The round-trip, daily Borealis train demonstrates the need for alternative travel options. These infrastructure improvements, education and information, programs and services all help Minnesotans reach their destinations and encourages modal shifts away from single-occupant vehicles, which supports our state Vehicle Miles Traveled reduction target.

- **Shared Mobility:**
  - Mobility as a Service (MaaS) – The Federal Transit Administration funded project helped to improve transit information for riders in Greater Minnesota by bringing rural transit schedules into General Transit Feed Specification (GTFS) so that transit routes in rural areas can be easily found in navigation apps including Google and Apple Maps.
  - Moving Greater Minnesota Forward – The first innovative incubator in the country focusing on rural, tribal and small urban areas. The program helps community leaders and members formalize early-stage ideas, pilot them and ultimately successfully scale them.
- **Complete Streets:** Provided targeted training to MnDOT staff with new or expanded roles per the updated 2022 Complete Streets Policy, designed a new internal Complete Streets reporting platform, and contributed to research projects to inform use of effective speed control measures and synthesize national funding and maintenance of Complete Streets practices.

Complete Streets Training. Photo courtesy of Nissa Tupper, MnDOT.

- **Active Transportation:**
  - Completed Statewide Pedestrian System Plan implementation activities focused on safety and climate change impact mitigation to people walking.
  - Initiated a second cohort of Active Transportation Program planning assistance work and demonstration project assistance.
  - Continued to develop and provide training for walking and bicycling topics to support district implementation of walking and bicycling improvements.
- **Safe Routes to School:** Safe Routes to School programs aim to improve safety, reduce traffic and enhance air quality near schools through a multidisciplinary approach. Starting August 1, 2023, all public-school students in Minnesota are now required to receive instruction in safe walking and bicycling skills at the beginning of each school year. MnDOT offers frequently asked questions, educational materials and additional resources to help schools implement this requirement.

Healthy Equitable Thriving Communities

In 2023, MnDOT made progress in fostering healthy and vibrant places that reduce disparities and promote healthy outcomes for people, the environment and our economy. This work included:

- Coordinating transportation and land use planning among transportation partners, stakeholders and the public.
- Conducting an Equity Health Assessment (EHA) as part of the Hwy 252/I-94 project. The EHA addressed how changes to Hwy 252/I-94 could impact equity and health for communities in the project area. Through the EHA process, the community identified community livability, transportation equity, and roadway safety as priorities and delivered a report with recommendations for how to consider these priorities in the project.
- Active transportation initiatives, including the Statewide Pedestrian System Plan and the Statewide Bicycle System Plan, include planning documents to highlight the benefits of providing safe, complete pedestrian and bicycle networks for people, the environment, and the economy. By understanding areas where pedestrian and bicycle improvements are most needed, MnDOT can make impactful investments to improve safety and increase the number of people walking and bicycling as part of their daily lives.
- MnDOT supports the work to reduce Vehicle Miles Traveled (VMT) with recommendations by a work group to improve transit, biking and walking throughout the state, and promote land development that makes it easier to get around without a vehicle. It also looks at the overall transportation system to identify ways to make it easier for Minnesotans to get where they need to go with different travel options.
- Continued work on the above-mentioned federal programs (NEVI, CRP and PROTECT), which provide funding for projects aimed at creating a cleaner, more resilient transportation system while addressing transportation inequities.

Successful implementation of these programs involved identifying, selecting and constructing eligible projects, helping MnDOT to reduce carbon and greenhouse gas pollution and increase resiliency throughout the transportation sector.

Cyclists on bridge in Maple Grove. Photo courtesy of Richard Kemp, MnDOT.

Guiding Statutes and Executive Direction: 2023 Updates

The following statutes and executive directions guide MnDOT's work on sustainability and public health.

MnDOT's sustainability initiatives and targets are guided by federal, state and agency requirements, which is described in the SMTP. The Minnesota Legislature updated the following statutes and executive directions in 2023, which guide MnDOT's work in advancing progress towards sustainability goals:

EXECUTIVE ORDER 19-27:

Directing State Government to Conserve Energy and Water, and Reduce Waste to Save Money

Executive Order 19-27 requires state government agencies to lead by example by reporting and making progress on the below 6 sustainability goals. In 2023, updates were made to these targets to further advance progress.

- Reduce fleet fossil fuel consumption: 30% reduction of state fleet consumption of fossil fuels by 2030 relative to a 2017 adjusted baseline.
- Reduce water consumption: 15% reduction of water use by 2030 relative to a 2017 adjusted baseline.
- Sustainable Procurement: 50% of total spending on priority contracts are sustainable purchases by 2025.
- Reduce GHG emissions: 50% reduction of GHG emissions by 2030 relative to a 2005 calculated baseline.
- Reduce energy consumption: 30% reduction in consumption of energy per square foot by 2030 relative to a 2017 adjusted baseline.
- Reduce solid waste: 75% combined recycling and composting rate of solid waste by 2030.

MINN. STAT. 161.178:

Transportation Greenhouse Gas Emissions Impact Assessment

The 2023 Minnesota legislature adopted requirements for MnDOT to mitigate the GHG emissions impacts of all capacity expansion projects on interstate, U.S. highway, state highway and business highway routes. The statues also established the Greenhouse Gas Emissions Impact Mitigation Working Group to prepare recommendations for implementing a Transportation Greenhouse Gas Emissions Impact Assessment for these capacity expansion projects on state highways prior to inclusion in the State Transportation Improvement Program (STIP) or a metropolitan Transportation Improvement Program (TIP). The working group was convened by the Commissioner of Transportation.

The goal of a Transportation Greenhouse Gas Emissions Impact Assessment is to align project decision-making with the State's greenhouse gas emissions reductions targets under Section 174.01 Subdivision 3 and Vehicle Miles Traveled (VMT) reduction targets established in the Statewide Multimodal Transportation Plan (SMTP).

MINN. STAT. 174.01:

Greenhouse Gas Emissions Targets

The 2023 Minnesota legislature required that the GHG Emissions targets include goals to reach net zero GHG emissions by 2050 and require the Commissioner of Transportation to set emission reduction targets specifically for transportation. Further, that these targets be allocated across the transportation sector accounting for regional differences across the state, but at a minimum specifically providing an allocation to the metropolitan area as defined in statute as the seven-county metropolitan council.

Collaboration and Partnerships

MnDOT's sustainability efforts require planning, coordination and involvement from staff across all departments and offices. MnDOT also collaborates with other state agencies, regional and local partners and the public to create sustainability and public health strategies for the agency to implement. In addition to the key groups mentioned below, MnDOT collaborates with topic-specific internal workgroups and broader national coalitions to guide the agency's sustainable transportation initiatives. As needs evolve, collaboration approaches evolve accordingly. Below are some examples of existing groups that were convened in 2023.

Internal Partners

RESILIENCE ADVISORY TEAM

In 2019, MnDOT established the internal Resilience Advisory Team (RAT) to guide the agency on resilience efforts. The multidisciplinary team consists of MnDOT staff from various offices across the agency and is tasked with the following responsibilities:

- Identify and recommend resilience priorities for the agency
- Discuss and address potential barriers and areas of concern
- Refine and expand on how the agency assesses and measure climate resilience

External Partners

SUSTAINABLE TRANSPORTATION ADVISORY COUNCIL (STAC)

The STAC provides recommendations to the MnDOT Commissioner to help the agency reduce carbon pollution from Minnesota's transportation sector, in alignment with the MnDOT statutory goals outlined in Minn. Statute 174.01, the Next Generation Energy Act and the annual MnDOT Sustainability Report.

The STAC workgroups listed below develop recommendations that prioritize climate action and equity:

- Fueling and Powering Workgroup
- Vehicle Miles Traveled (VMT) Workgroup

The goal of the STAC is to facilitate Minnesota's transition to a low-carbon transportation system that is consistent with statutory objectives for energy and emissions reductions. At the September 2023 STAC meeting, members supported pausing the recruitment of a 2024-2025 STAC cohort. The STAC paused in 2024 to work through legislative changes that occurred in 2023.

GOVERNOR'S CLIMATE CHANGE SUBCABINET

The Governor's Climate Change Subcabinet includes executives from 15 state agencies, departments and boards. The subcabinet was established to take on several actions.

- Identify policies and strategies that will put Minnesota on track to meet or exceed the Next Generation Act goals to reduce GHG emissions.

- Identify policies and strategies to enhance the climate resiliency of Minnesota's natural resources, working lands, and communities and to assist state agencies, businesses, and local communities to prepare for climate change impacts that cannot be avoided or mitigated.
- Engage with Minnesotans on complex issues related to climate action.
- Promote equitable policy solutions that reduce disparities in Minnesota, ensure a just transition for impacted workers and communities and encourage green economic development and job creation.

To identify effective policies and strategies, state leaders convene action teams across state agencies to address challenges and opportunities each faces from climate change.

MnDOT participates on three action teams to inform state-level transportation, sustainability and public health strategies:

- Climate Engagement Team: Identifies opportunities to reduce emissions and build resiliency in our communities.
- Transportation Action Team: Identifies strategies to address climate change and reduce carbon in the transportation sector in Minnesota.
- Resilience and Adaptation Action Team: Leverages a pre-existing inter-agency team to identify the policies and strategies that build resiliency and adaptation called for in EO 19-37.

CLIMATE AND RESILIENCE WORKGROUP

The Climate and Resilience Workgroup (CRW) provides recommendations for the newly established federal transportation programs to MnDOT's Transportation Programming and Investment Committee (TP&IC). It includes:

- **Electric Vehicle (EV) Subgroup:** Formed to advise MnDOT on the distribution of NEVI funds, give feedback on plan development and represent stakeholder interests in developing the EV charging network.
- **Carbon Reduction Program (CRP) Subgroup:** The CRP Subgroup advises MnDOT's CRW on how to distribute and solicit for the CRP formula funds and provide oversight of the Carbon Reduction Strategy (CRS).
- **Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) Subgroup:** The purpose of the PROTECT Subgroup is to guide the development of the Resilience Improvement Plan (RIP) and distribution of PROTECT formula funding in Minnesota approved by FHWA in July of 2024.

LOCAL AGENCY VEHICLE MILES TRAVELED (VMT) WORKGROUP

The Local Agency VMT Workgroup convenes partners from cities and counties representing the entire state (including elected officials, planners and engineers) to share and develop resources related to the Statewide Multimodal Transportation Plan (SMTP) VMT reduction target.

The group's goals are:

- Develop a shared understanding of why we're measuring outcomes with a VMT target
- Provide input to MnDOT's emerging VMT research, education, and strategy development
- Guide development of consistent VMT modeling
- Support development of local VMT strategies, MnDOT's support of local partners

The Local Agency VMT Workgroup launched in November 2022 and meets monthly. The workgroup is jointly staffed by the OSPH and State Aid.

NEXTGEN HIGHWAYS WORKING GROUP

In 2021, the STAC recommended MnDOT analyze NextGen Highways, a proposed model for the co-location of transmission and broadband in highway rights of way. A workgroup was formed with MnDOT, the Minnesota Department of Commerce, the Public Utility Commission (PUC), and the FHWA Minnesota Division. In 2023, the group was sunsetted after achieving several key outcomes, including:

- Greater understanding within MnDOT of highway transmission allowances, resulting in a short-term increase in requests for right-of-way usage
- Expanded appreciation for shared decarbonization goals, highlighting the need for transmission to electrify transportation and reduce GHG emissions across sectors.
- New processes initiated to support early coordination and environmental analysis of transmission projects, fostering continued collaboration with Commerce's Energy Environmental Review and Analysis (EERA) unit

At the end of 2023, MnDOT was invited to apply to be a deployment state for AASHTO's Moonshot Initiative in 2024 to share learnings with other states on the use of highway rights of way for transmission to support the clean energy transition. MnDOT was accepted as a deployment state in 2024.

CLEAN TRANSPORTATION STANDARD WORK GROUP

The 2023 Legislature established the Clean Transportation Standard (CTS) Work Group to study and address information gaps and opportunities related to implementing a clean fuel standard in Minnesota. The work group was jointly convened by the Commissioners of Agriculture, Commerce, Transportation, and the Pollution Control Agency. The goal of the work group is to reduce the overall carbon intensity of transportation fuel supplied in the state.

Strategic Partnerships

MnDOT's Strategic Partnerships program was launched in 2021 to expand collaborative opportunities with external groups on climate action, public health, quality of life, clean energy and transportation equity. Emerging state, federal and local priorities offer MnDOT opportunities to embrace innovation and leverage new opportunities to generate community benefits through transportation investments. MnDOT seeks to collaborate with non-traditional partners to explore alternative uses of highway rights of way to be responsive to increasing requests for non-transportation uses while ensuring the safe operation of the transportation system.

These external partnerships are important in many ways. They help build trust with businesses, nonprofits, community organizations, the public and other state agencies. They can help support quality of life, shared and future mobility, public health, decarbonization and electrification. Working strategically, MnDOT can remove barriers to effectively align new and emerging uses of right of way for decarbonization and traditional/non-traditional partnership efforts with MnDOT's Strategic Goals.

The Strategic Partnerships Program seeks to:

- Analyze impacts, risks, and opportunities of new and alternative uses of right of way, new partnerships, emerging trends, and future mobility opportunities to improve policies, standards, procedures, guidelines and practices

- Address or remove policy barriers in partnership with stakeholders, interest groups, local units of government, regional and other state agencies to get input and assistance and to gain insight into their needs and issues related to alternative uses of right of way projects, equity, quality of life, connectivity, sustainability, decarbonization and public health transportation investments
- Activate partnerships that leverage outside resources for improved community outcomes
- Promote alternative non-highway uses of right of way (AUROW) that offer community, social, environmental or economic benefits in alignment with MnDOT's family of plans
- Inform early coordination processes and processes for proactive engagement of partners, including non-traditional transportation partners

CONDUCTING RESEARCH TO ANALYZE TRANSPORTATION AND ARTS & CULTURE STRATEGIES

In 2023, MnDOT partnered with the University of Illinois and DrK Consulting on a research project titled, *"Utilizing Arts and Culture to Mitigate the Negative Impacts of Transportation Infrastructure on Communities."* This project was launched to evaluate arts and culture as mitigation strategies to evaluate the historical negative impacts of transportation projects on BIPOC (Black, Indigenous, and people of color) and low-income communities. It seeks to identify ways for state departments of transportation (DOTs) to improve planning by actively engaging these communities and incorporating their feedback.

The research project analyzed case studies that demonstrate how arts and culture can effectively engage communities to guide transportation agencies. It provided insights into aligning MnDOT's transportation equity vision with community-centered approaches. Key recommendations included developing a framework for documenting engagement processes, reimagining art as a core aspect of planning rather than a mere aesthetic addition and ensuring transparent communication with communities. The project also advocated for involving artists and cultural leaders as collaborators, aiming to enhance community engagement in infrastructure projects for mutually beneficial outcomes. The project was underway in 2023 and a final report completed in 2024.

Chicano Park case study used in MnDOT research project. Photo courtesy of Ariana Drehsler.

Reporting Framework

The annual MnDOT sustainability report tracks progress toward operational sustainability targets, highlights new planned actions and identifies areas for improvement. Each content section begins with an overview of the focus area, a collection of recent accomplishments, and a success story from the MnDOT districts. Then, detailed information about the relevant metrics, targets and actions is provided.

Metrics

Each focus area describes progress on a set of metrics used to measure progress toward targets. Tracking these metrics help MnDOT make decisions and evaluate the effectiveness of policies, strategies, and investments.

Targets

Targets in the report were established by state statute, executive orders, the MnDOT family of plans, and the Sustainable Transportation Steering Committee.

Planned Actions

Each focus area includes a table of planned actions that were identified by MnDOT subject matter experts and OSPH staff to make progress on the targets. The Planned Actions tables list actions along with their status indicator, anticipated completion date, and co-benefits. MnDOT subject matter experts and OSPH staff evaluated the co-benefits of each action based on the evaluation criteria listed to the right.

Focus Areas

Lead by example through MnDOT sustainability efforts

- Facilities
- Fleet
- Highway Operations
- Roadside Vegetation
- Construction

Evaluating Co-benefits

Potential to reduce greenhouse gas emissions

- Does this action decrease greenhouse gas emissions?

Potential to improve public health

- Does the action enhance safety and injury prevention, physical activity and active transportation, environmental health, connectivity and access or equity?

Potential to support climate resilience

- Does the action reduce vulnerability of infrastructure or community, increase flood resilience or support evacuation and emergency response?

Facilities

METRICS

- Facilities greenhouse gas (GHG) emissions
- Energy intensity
- Renewable energy
- Water consumption
- Municipal solid waste recycling rate

Overview

MnDOT is dedicated to managing resources efficiently at agency owned and operated facilities. MnDOT owns over 1,000 buildings, totaling more than 6.6 million square feet. These facilities use significant amounts of energy, water, and produce waste. Executive Order 19-27 directs state agencies to manage these resources responsibly.

Energy

MnDOT facilities are served by over 80 different utilities, including investor-owned utilities, local public utilities, municipal utilities and electric cooperatives. MnDOT is required to establish site-specific goals to decrease energy consumption across agency owned facilities.

Water

At MnDOT facilities, water is used for rest room purposes, equipment cleaning, truck washing and producing liquid salt brine. Reducing water usage offers several benefits, including lowering energy consumption and costs, minimizing equipment wear and tear, reducing volumes of treated wastewater discharged into the watershed, and improved resilience on the wastewater system to handle extreme weather events.

Waste

MnDOT office workers generate both municipal solid waste (such as paper, cans and cardboard) and specialty waste (such as fluorescent lightbulbs and motor oil). To manage this waste, MnDOT facilities provide recycling and trash collection services for staff and visitors and encourages the recycling of specialty waste whenever possible.

2023 Accomplishments

- Continued to decrease the greenhouse gas emissions target for facilities, down 48% since 2008.
- Continued a retro-commissioning program at existing facilities.
- Continued implementation of temperature set point standards and HVAC upgrades.
- Major lighting upgrades in Metro district, including lighting retrofit at Oakdale Headquarters and Maple Grove and Plymouth truck stations.
- Northfield truck station completed construction on the solar array.

Fairmont truck station, which had an HVAC and Building Automation System (BAS) upgrade in 2023. Photo courtesy of Mark Moehlenbrock, MnDOT.

DISTRICTS IN THE SPOTLIGHT:

Metro Oakdale Headquarters

MnDOT's Metro Oakdale Headquarters underwent a building automation system (BAS) upgrade in 2021. The BAS upgrade enabled the implementation of temperature set points standards and improved HVAC control sequences. This included local temperature set point override buttons in warm storage and demand-control ventilation using occupancy sensors in office areas.

In 2023, office lighting upgrades improved the aesthetics of the space, reduced maintenance costs and reduced lighting electrical consumption by 50%. Overall, building energy use in 2023 was 43% below the 2007 baseline, while greenhouse gas emissions were 58% lower than the baseline.

Improved Lighting at Metro Oakdale Headquarters. Image courtesy of Mark Moehlenbrock, MnDOT.

BENEFITS OF THE PROJECT INCLUDE:

- More effective HVAC equipment control
- Reduced energy/GHG
- Improvement in quality of office lighting over fluorescent tubes

Measuring Progress

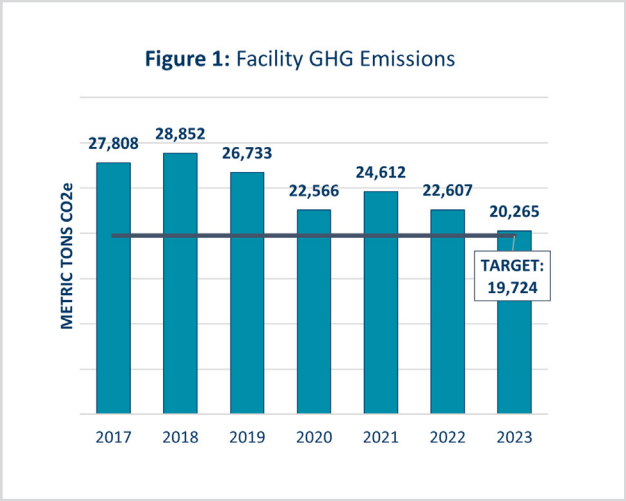


Figure 1: Facility GHG Emissions. Source: SRT, B3.

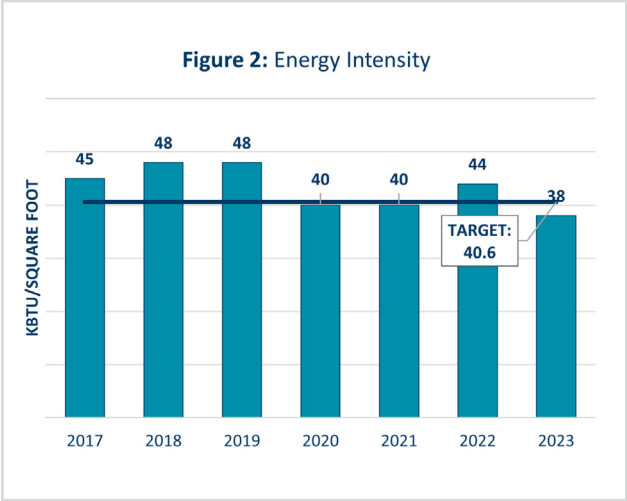


Figure 2: Energy Intensity. Source: SRT, B3.

Facilities GHG Emissions

TARGET: Reduce GHG emissions by 50% from 2005 levels by 2030.

RESULTS: Between 2008 (the earliest date MnDOT has data for) and 2023, the agency reduced greenhouse gas emissions from MnDOT owned and operated facilities by 48%.

MnDOT is on track to meeting its facilities greenhouse gas (GHG) emissions reduction target. Reduced GHG emissions at MnDOT facilities is due to a cleaner electricity grid, ongoing renewable energy projects and improved energy efficiency measures, including setting the thermostats withing a temperature range, and using sensors to turn off lights when room is not in use.

Energy Intensity

TARGET: By 2030, reduce building energy intensity use per square foot by 30% from a 2008 adjusted baseline.

RESULTS: Between 2008 and 2023, MnDOT reduced building energy intensity by 34%.

Energy reduction is driven by ongoing energy efficiency improvements. From January through April 2023, Minnesota experienced significant snowfall, leading to increased energy use at truck stations. However, the mild winter conditions in November and December of 2023 contributed to energy savings. Teleworking provides some energy benefits by reducing plug loads; however, the relationship between building population and building energy use is not linear. Even if one person is present at a MnDOT site, the agency still needs to heat and cool the space. MnDOT's HVAC systems are scheduled to operate daily during occupied hours. MnDOT utilizes occupancy sensing to shut off lights and lower the minimum air ventilation requirements in unoccupied zones, but still needs to condition spaces as if they are 100% occupied. Additionally, fewer occupants can increase the heat load in buildings.

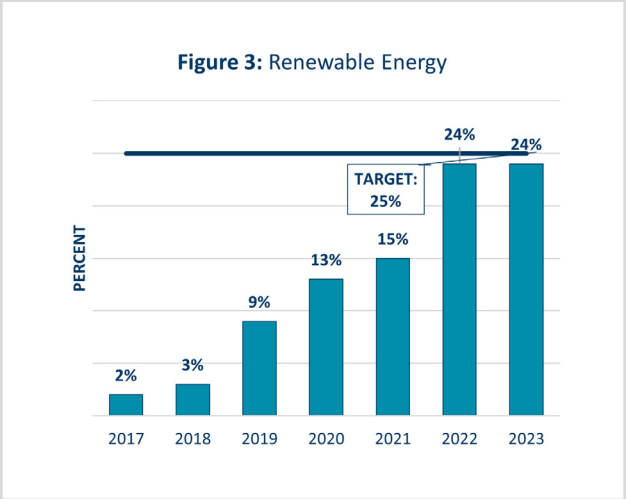


Figure 3: Renewable Energy. Source: SRT, B3, reports supplied by vendors, meter readings.

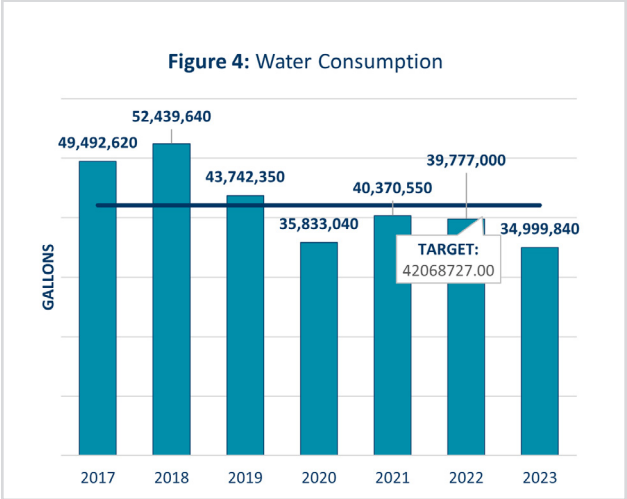


Figure 4: Water Consumption. Source: SRT, B3.

Renewable Energy

TARGET: Subscribe to or use renewable energy to meet 25% of agency energy needs.

RESULTS: In 2023, MnDOT subscribed to or produced renewable energy equivalent to 24% of agency electricity use, remaining stable from the previous year.

In 2023, MnDOT's solar energy production, off-site wind subscriptions, and community solar garden subscriptions accounted for 24% of the electricity needs at agency facilities, almost reaching the 25% target. MnDOT generated its own energy through solar arrays at Central Office, the Morris Office in District 4, the District 6 Maintenance and Operations facility in Rochester, and a formerly MnDOT-owned gravel pit in Afton. The addition of new solar capacity, along with community solar garden subscriptions, allowed the agency to fulfill a greater portion of its electricity needs with renewable sources.

Water Consumption

TARGET: Reduce building water use by 15% from 2017 levels by 2030.

RESULTS: Between 2017 and 2023, MnDOT decreased water use at agency owned and operated facilities by 29%.

Water usage decreased by 12% from 2022 to 2023, while liquid brine production dropped by 30.5%. However, the reduction in brine production was largely due to significant snowfall in 2022 and less snowfall in 2023. Despite this, MnDOT produced 9.76 million gallons of liquid brine in 2023, continuing the general upward trend in brine production, which is expected to persist as MnDOT continues to invest in brine equipment and facilities.

While brine production increases water use, it reduces reliance on road salt, offering significant water quality benefits and environmental benefits.

On the non-brine side, MnDOT continues to reduce water consumption at its facilities. We have standardized the use of 0.125-gallon per flush urinals and 1.28-gallon per flush toilets in all new construction, and we remain committed to using high-efficiency fixtures. Additionally, we do not install irrigation systems and use native plantings and low-maintenance turf at our facilities.

Despite these efforts, we do not expect that improvements in building water efficiency will be enough to offset the increased water use from liquid brine production. This underscores the agency's ongoing challenge of balancing sustainability goals with public safety and environmental protection.

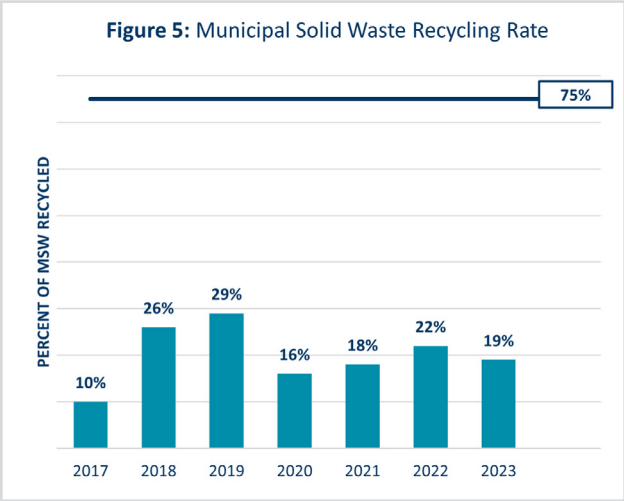


Figure 5: Municipal Solid Waste Recycling Rate. Source: SRT, B3.

Municipal Solid Waste Recycling Rate

TARGET: Achieve 75% recycling and composting rate by 2030.

RESULTS: In 2023, MnDOT's Municipal Solid Waste recycling rate decreased to 19%.

To achieve a 75% recycling and composting rate by 2030, MnDOT needs to increase waste diversion by approximately 20% each year. In 2023, MnDOT was identified as one of eight major waste generators among state agencies. One of the key challenges in meeting this goal is the large number of facilities MnDOT operates statewide. Additionally, some areas of the state have limited access to recycling or composting haulers. Recycling rates are higher at MnDOT headquarters and truck stations compared to rest areas. The Office of Enterprise Sustainability has developed a Solid Waste Action Plan for 2025 to 2030, which emphasizes the need for increased efforts from the largest waste generators, including MnDOT.

2024 Planned Actions Table

Many of the planned actions have the potential to reduce GHG emissions by using less energy or using renewable energy. By drawing less energy from power plants, the actions will reduce air pollutants and improve public health. The actions that reduce water consumption have the potential to support climate resilience by drawing less on local aquifers, discharging less wastewater into the watershed and increasing the wastewater system capacity to handle extreme weather events.

			POTENTIAL TO...		
ACTION	STATUS	COMPLETE BY	Reduce GHG emissions	Improve public health	Support climate resilience
1. Develop facility energy plans for one additional MnDOT district that identify energy efficiency and renewable energy projects.	*In Progress*	Ongoing	✓	✓	✓
2. Remove barriers to implementation for compliance with agency temperature set points.	*In Progress*	Ongoing	✓	✓	
3. Continue energy efficiency projects (e.g., building automation, upgrades to equipment, and lighting).	*In Progress*	Ongoing	✓		
4. Evaluate opportunities to expand recycling (including organics) at facilities statewide.	*In Progress*	Ongoing	✓	✓	
5. Implement water fixture improvements in the 2018 Facility Water Reduction Assessment.	*In Progress*	Ongoing	✓		✓
6. Add urinals to reduce water use in bathrooms as they are updated.	*In Progress*	Ongoing	✓		✓
7. Add water conservation measures in new building construction and existing building renovation.	*In Progress*	Ongoing	✓		✓
8. Retro commission existing MnDOT facilities.	*In Progress*	Ongoing	✓		

Fleet

METRICS

- Fleet greenhouse gas (GHG) emissions
- Fleet fossil fuel use
- Light-duty fuel efficiency
- Electric vehicles
- Employee-owned auto mileage

Overview

MnDOT uses a variety of vehicles and fuels to carry out several tasks including maintenance, delivery, transportation, assessment and services. In 2023, the agency used more than 2,400 vehicles including light-duty, medium and heavy-duty and off-road vehicles. MnDOT is dedicated to decreasing fossil fuel usage in its fleet, MnDOT is dedicated to decreasing fossil fuel in its fleet through various strategies.

In 2023, the State legislature passed a vehicle purchasing hierarchy, directing agencies to first choose electric, plug-in hybrid, and efficient vehicles, in that order. MnDOT is gradually transitioning our light-duty fleet vehicles to electric and plug-in hybrid models where appropriate. Heavy and medium-duty vehicles, such as trucks and snowplows, primarily run on diesel. Approximately 70% of the fossil fuel consumption in MnDOT's total fleet is from diesel fuel. Winter severity is the most significant factor of changes in year-to-year fuel use, as more snow and ice events increase the agency's vehicle miles travelled for snowplowing. Currently, there are few alternative fuel options available for the medium and heavy vehicle fleet. The greatest barriers to electric vehicle (EV) adoption are the lack of charging infrastructure, limited vehicle availability and technological limitations. MnDOT cannot transition to using electric vehicles that lack the necessary capabilities to meet the agency's operational requirements. Future support needs include: a strategic approach to EV charging infrastructure, improved technology, vehicle availability and comprehensive training programs around the usage of electric vehicles.

2023 Accomplishments

- Added one battery EV to the fleet in 2023.
- MnDOT's hybrid work environment has reduced travel by utilizing virtual meetings when appropriate, which in turn helps reduce fossil fuel use.
- MnDOT continued piloting the use of a Ford Lightning truck in our fleet. While its limited range made it unsuitable for long, multi-job workdays, it proved effective for shorter travel needs. However, as most districts need an EV with at least 300 miles of range that can withstand cold temperatures, the truck will be sold in favor of a longer-range vehicle for fleet use.
- MnDOT completed the preparation work for a project in District 8 to outfit five trucks with the necessary equipment to run on B100. While this is not a zero emission project, it could result in a significant reduction in carbon emissions as compared to standard diesel fuel. The project is anticipated to be completed by early 2025.

PROJECT SPOTLIGHT:

Statewide Geotab Rollout

MnDOT strives to continuously improve the environmental sustainability, efficiency and safety of its fleet. In 2023, more than 3,000 telematics devices were installed in light and medium-duty fleet vehicles, which includes sedans, standard pickup trucks, vans and one-ton pickups. Additionally, heavy-duty trucks, plow trucks and some off-road equipment were equipped as well. Telematics is a way of monitoring fleet equipment using GPS technology and vehicle diagnostic information.

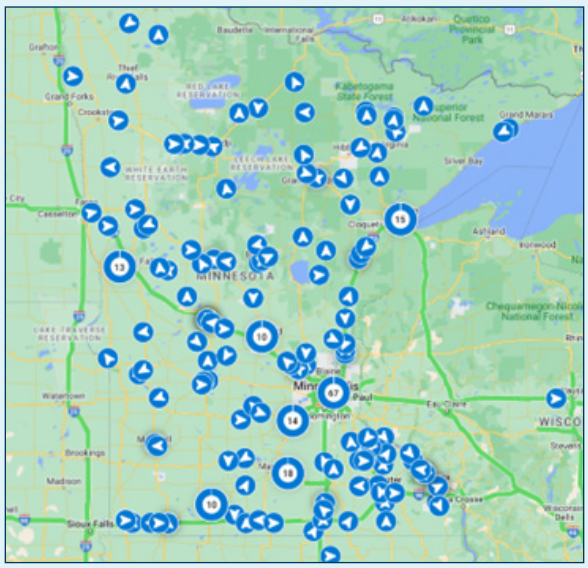


Figure 6. Map Showing Active Units. Source: GovGeotab.

Telematics data will help improve safety, accountability, fleet optimization and environmental sustainability. To achieve these goals, the telematics system collects data and generates reports based upon the data that can be utilized to make sound decisions across MnDOT's fleet. Telematics can identify EV candidates for MnDOT's light duty fleet by reporting route data, vehicle data, duty cycles, and capturing seasonal differences which will help with transitioning to EVs.

Some current uses of telematics data include plow truck location and camera images. This data is fed to 511 and allows the public to see plow location as well as road conditions in real time. Engine diagnostics are also monitored. When the computer on board vehicles senses problems, a diagnostic trouble code is activated. This information can be sent to a repair shop immediately so the unit can be diagnosed even before the equipment makes it to the repair location.

MnDOT is continuously working on developing measures and targets of telematics data. This will allow the agency to better understand, maintain, and improve the use of fleet vehicles, ensure appropriate use and to address operational issues, fuel consumption or vehicle maintenance, as well as ensure the safety of the employees and the public. Examples of some of these reports will include excessive idling within a defined zone, collision alerts, speeding, seat belt usage, excessive backing, low utilization and snow and ice material application.

This technology will ensure that MnDOT continues to be a leader in sustainability, efficiency, and safety as we move into the future.

Measuring Progress

Fleet Greenhouse Gas Emissions

TARGET: By 2030, reduce greenhouse gas emissions from fuel used by MnDOT vehicles by 50% from 2005 level.

RESULTS: Between 2005 and 2023, fleet GHG emissions increased by 18%.

MnDOT's greenhouse gas emissions from fuel use have increased since the 2005 baseline year due to higher fleet utilization. However, between 2022 and 2023, there was a 9% decrease in fleet greenhouse gases. Part of the reason why this number fluctuates over the years is due to changes in winter severity. For example, the milder winter of 2023-2024 resulted in reduced use of and miles traveled for MnDOT snowplows, which primarily operate on diesel and emit more greenhouse gases. In 2023, snowplow trucks traveled approximately 354,000 less miles as compared to 2022. MnDOT still needs to achieve a reduction of approximately 80.9% to meet its target by 2030.

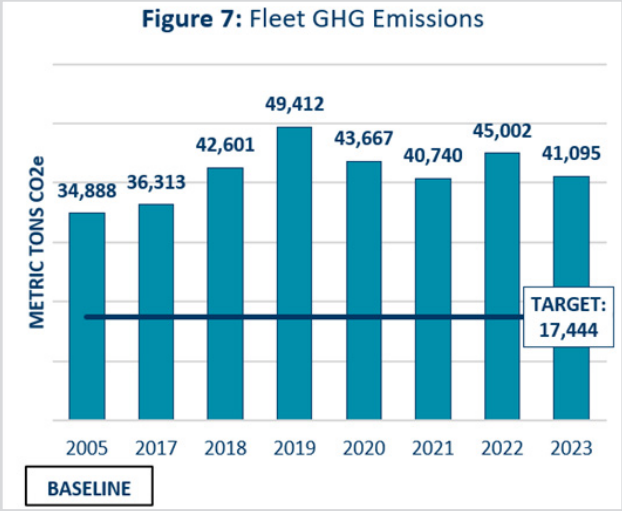


Figure 7: Fleet GHG Emissions. Source: SRT, M5.

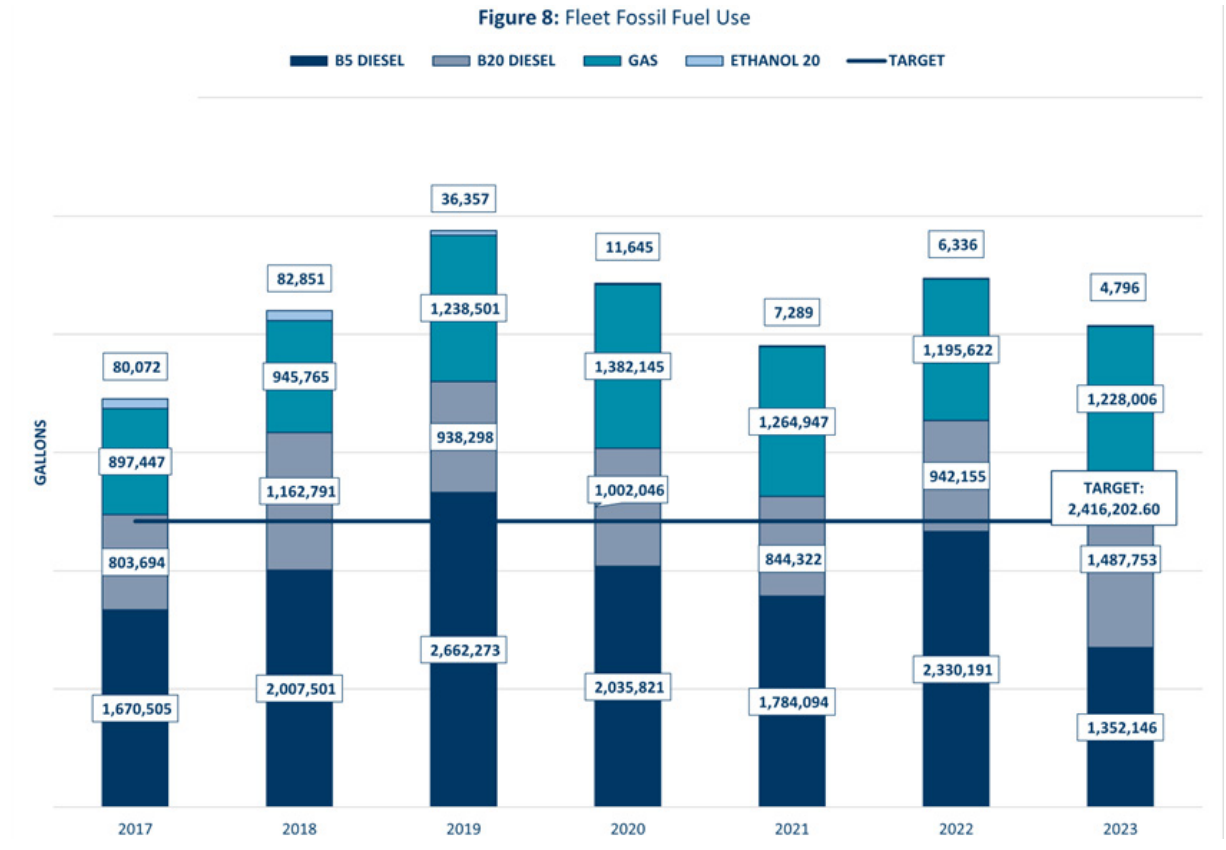
Fleet Fossil Fuel Use

TARGET: By 2030, reduce fossil fuel use from MnDOT vehicles by 30% from 2017 levels.

RESULTS: Between 2017 and 2023, fossil fuel use by MnDOT vehicles increased by 18%.

While fleet fossil fuels have increased from the baseline year to 2023, there was a decline of about 9% between 2022 and 2023. As mentioned above, the milder winter contributed to less need for MnDOT snowplows and therefore less fossil fuel use. Post-COVID fleet demands are still being evaluated but may relate to less overall miles per gallon of fuel consumed. Additionally, the newer vehicles MnDOT adds to the fleet are more fuel efficient.

Figure 8: Fossil Fuel Use. Source: SRT, M5.



Light-duty Fuel Efficiency

TARGET: Achieve an average light-duty fuel efficiency of 30 mpg or more by 2025.

RESULTS: Average light-duty fuel efficiency has remained stable between 2022 and 2023 at 18 miles per gallon (mpg).

Light-duty fuel efficiency measures the fuel efficiency of MnDOT sedans, SUVs, vans and pick-up trucks that weigh less than 8,500 lbs. In 2023, there were approximately 565,000 less miles traveled in light and medium duty units in as compared to 2022.

The vehicle life cycle for sedans in the MnDOT light-duty fleet is eight years. Fuel efficiency improves as light-duty vehicles are incrementally replaced with more efficient and electric models. Additionally, MnDOT is utilizing telematics to reduce vehicle idling and support other immediate improvements to fuel efficiency.

Figure 9: Light Duty Fuel Efficiency

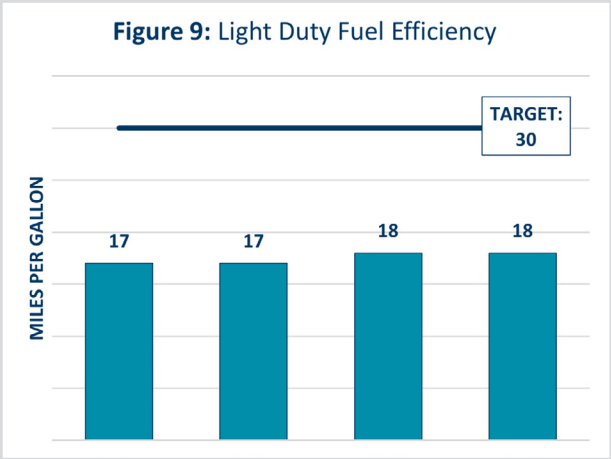


Figure 9: Light-duty Fuel Efficiency. Source: SRT, M5.

Electric Vehicles

TARGET: Transition 100% of MnDOT sedans and SUVs to zero emission vehicles by 2030.

RESULTS: In 2023, MnDOT had 80 sedans, 135 SUVs, 54 vans and 708 light duty pick-up trucks, all considered light duty, totaling 977 vehicles. Of these, 4% of MnDOT sedans, SUVs, vans, and light-duty trucks were battery EVs (BEVs) or plug-in hybrid EVs (PHEVs).

MnDOT added one BEVs to the fleet and reduced PHEVs by 6 during the calendar year of 2023. Only BEVs are considered zero emission vehicles since they run solely on electricity; PHEVs use both electricity and gasoline, but their hybrid nature still has a smaller environmental impact than traditional vehicles. PHEVs and vehicles that use biodiesel are considered transition vehicles because they help reduce reliance on traditional fossil fuels, serving as intermediate solutions as we shift towards zero emission vehicles.

Several factors present significant challenges to meeting the EV fleet transition target by 2030, including operational constraints, limited availability of charging infrastructure, procurement delays caused by supply chain disruptions and timing of the existing fleet replacement schedule.

A Chevy Bolt EV from the MnDOT Central Office fleet. Photo courtesy of Beth Croteau-Kallestad, MnDOT.

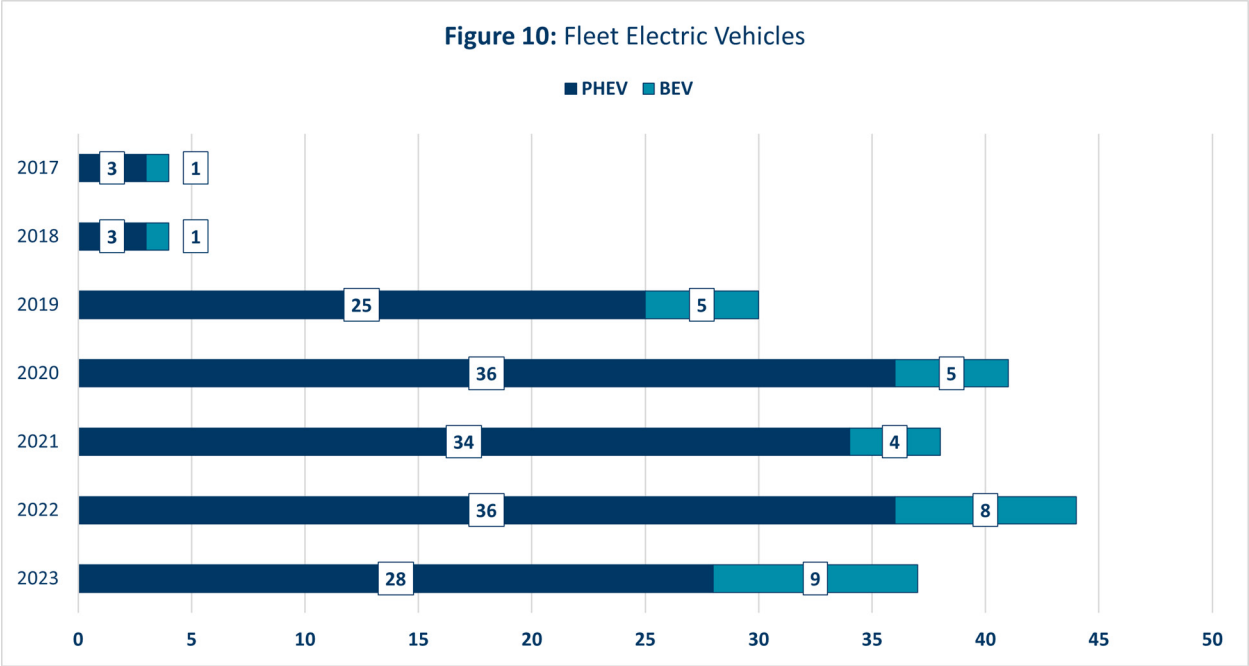


Figure 10: Fleet Electric Vehicles. Source: SRT, M5.

Employee-owned Auto Mileage

In 2023, employee-owned auto mileage was about 25% higher than in 2022. MnDOT has no target for reducing employee-owned auto mileage and does not currently track employee fuel use consistently. MnDOT encourages employees to use the right mode for the right job, including carpooling and offering virtual meetings. Employee-owned auto mileage had dropped significantly between 2019 and 2021, primarily due to COVID-19, but has been on the rise as in-person meetings and events have become common again.

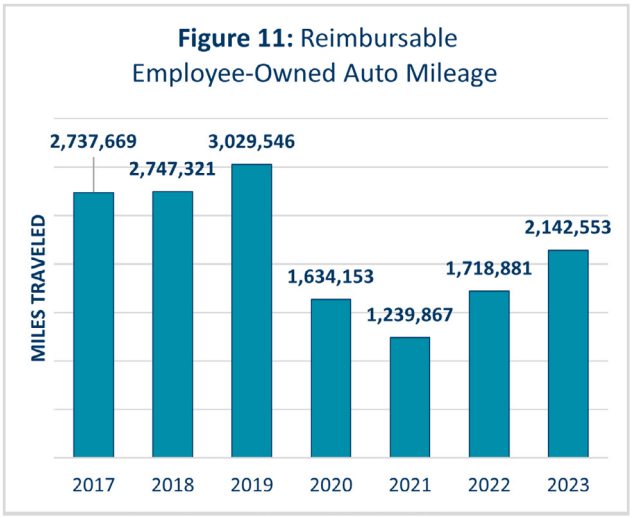


Figure 11: Reimbursable Employee-Owned Auto Mileage. Source: Labor Distribution and PS Account.

2024 Planned Actions Table

The following actions are planned for 2024 to reduce the fossil fuel use and greenhouse gas emissions from the MnDOT fleet. Fleet vehicles powered by fossil fuel generate air pollution, which is a health risk, and reducing emissions from the MnDOT fleet benefits public health.

			POTENTIAL TO...		
ACTION	**STATUS**	**COMPLETE BY**	**Reduce GHG emissions**	**Improve public health**	**Support climate resilience**
1. Continue to track and communicate flags to District staff to eliminate unnecessary idling.	*In Progress*	Ongoing	✓	✓	
2. Apply for grant funding to upgrade bulk fuel dispensers for compatibility with up to B100.	*On hold*	TBD	✓	✓	
3. Pilot EV pickups to determine which vehicle types best meet MnDOT's needs.	*In Progress*	Ongoing	✓	✓	
4. Partner with Xcel Energy and Sawatch Labs to electrify MnDOT vehicles and address charging needs.	*In Progress*	Phase 1 completed as of summer 2022. Phase 2 in progress.	✓	✓	
5. Develop recommendations to optimize snowplow routes and fuel use.	*In Progress*	TBD	✓	✓	
6. Track electric and hybrid vehicle utilization and resulting savings accrual/emissions reduction.	*Not started*	Ongoing	✓	✓	

Highway Operations

METRICS

- Gallons of liquid per ton of salt used
- Salt use
- Snow fences
- LED bulb replacement and greenhouse gas emissions savings

Overview

MnDOT is committed to ensuring safe winter driving conditions using strategies and methods that limit harmful environmental impacts. The agency utilizes various approaches to improve salt sustainability, which include use of liquid chemical deicers in combination with traditional salt and sand, using plows to cut down on salt usage, conducting research to identify alternative deicers and using mobile observations to optimize use of salt. MnDOT also uses living snow fences, structural snow fences, standing corn rows, strategically placed bales, native tallgrass wildflower prairie plantings, and road design elements to further reduce the need for snow management.

Snowplow removing snow in Plymouth. Photo courtesy of Richard Kemp.

2023 Accomplishments

- Statewide education of maintenance staff and calibration of snow and ice equipment for both liquid and granular application to reduce the amount of salt on the road.
- Dedicated additional investment of $4M annually for the liquid expansion effort including production, storage, application, research and training.
- Phase II testing of liquids-only at Camp Ripley. The test focused on application rate, placement location on lane and the subsequent target regain times and friction measures.
- Awarded over $13.7 million from the PROTECT Discretionary Grant Program to install 24 miles of snow fences across 38 sites to address snow control along nearly 120 miles of the I-94 corridor.

DISTRICTS IN THE SPOTLIGHT:

Solar Snow Fence in District 4

MnDOT collaborated with North Dakota State University (NDSU) on a pilot project to install a solar snow fence along 100 feet of Highway 10 in Glyndon, Minnesota. This is a device designed to trap snow as it blows across fields and prevents it from accumulating on a roadway, while also generating electricity through solar panels along its length.

The snow fence will improve public safety by keeping the roadway clear of snow and ice and reduce the hours MnDOT plows will need to operate resulting in a reduction in greenhouse gas emissions. The project will protect nearby bodies of water by reducing the need for salting roadways. The fences will also help prevent road closures in winter and improve travel times for drivers. In addition, during the winter months, the solar snow fence can capture enough solar energy to be equivalent to the typical energy needs of one residential home. The pilot project shows that a more widespread adoption of solar fences is feasible.

NDSU Solar Snow Fence Photo taken by Dan Gullickson, MnDOT, January 2024.

Measuring Progress

Reduction in Total Salt Applied to Roadways

Ratio of liquid to solid de-icing chemicals applied to roadways for snow and ice control

TARGET: 200 gallons of liquid per ton of solids (salts) applied annually by 2027.

RESULTS: During the winter of 2022-2023, an average of 54 gallons per ton of solids (salts) were applied. During the winter of 2023-2024, an average of 85 gallons per ton of solids were applied. It should be noted that the results being described for this target are from the full winter season, including outlier snow events, from October through May of the following calendar year.

Between the winter of 2022-2023 to 2023-2024, there was a 57% increase of gallons per ton of salt use. Such a significant spike over just one year is unusual and can largely be attributed to the mild winter rather than MnDOT's coordinated efforts.

Efforts to advance our goal of salt reduction require equipment to produce and apply brine, storage capacity increases at facilities and on trucks, real-time application recommendations, research, and training to grow the program. Incremental progress in each of these aspects are being made yearly.

Salt Use

During the 2023-2024 season, salt usage dropped to 114,155 tons, thanks to milder winter conditions that required less frequent and lower volume applications of both solid and liquid salt. Furthermore, MnDOT increased its use of brine, which allows for more efficient salt usage. Like Figure 12, it should be noted that the results being described for this target are from the full winter season, including outlier snow events, from October through May of the following calendar year.

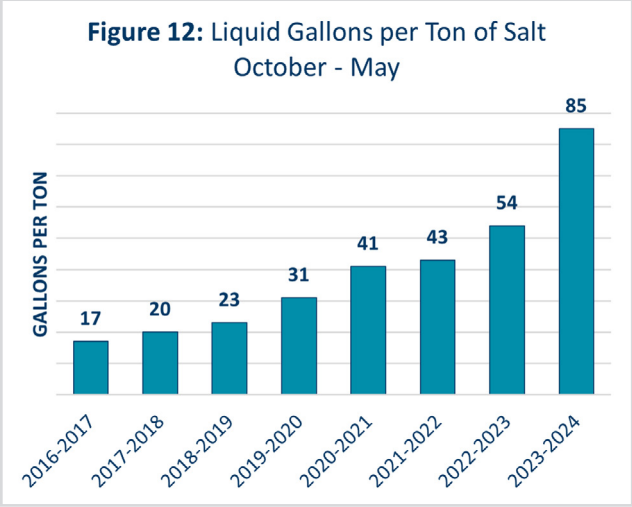


Figure 12: Liquid Gallons per Ton of Salt. Source: Winter Maintenance Report.

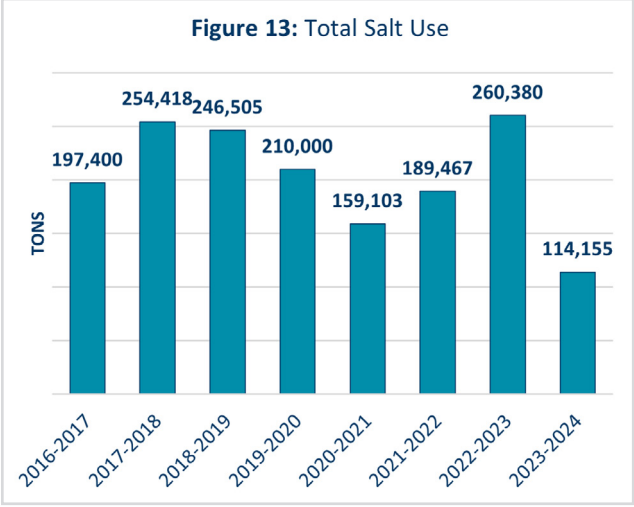


Figure 13: Total Salt Use. Source: Winter Maintenance Report.

Snow Fences

RESULTS: Total miles of long-term snow fences (living and structural) increased by 14% between 2022 and 2023. Total miles of temporary (standing corn row) snow fencing installed increased by 10.57% between 2022 and 2023.

Each snow fence is unique in terms of how many tons of snow it can capture due to the differences in fence height, porosity, and the unsheltered fetch distance. MnDOT is continuing to identify how to best quantify the performance measures of snow fences but intend on continuously increasing mileage of these fences.

Figure 14: Snow Fences

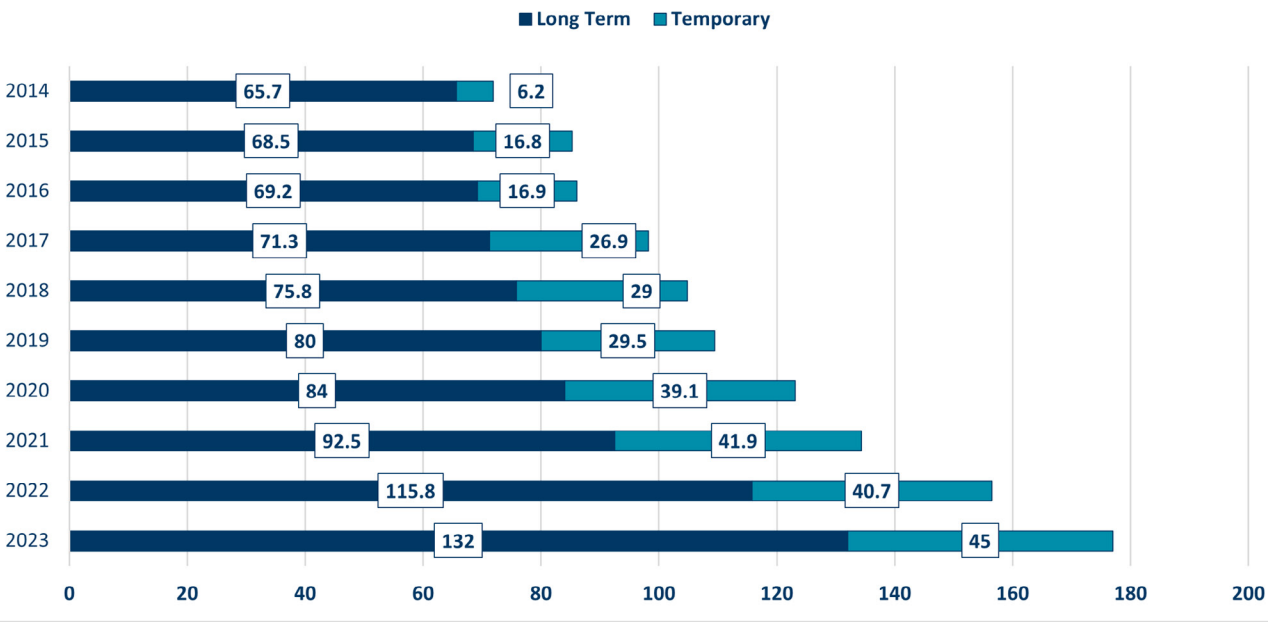


Figure 14: Snow Fences. Source: Winter Snow Fence Activity Report.

2024 Planned Actions Table

The following actions have the potential to lower greenhouse gas emissions by reducing the distance MnDOT fleet vehicles drive to apply salt and chemicals to roadways. Using less salt also has the potential to improve public health by supporting water quality.

ACTION	STATUS	COMPLETE BY	POTENTIAL TO...		
			Reduce GHG emissions	Improve public health	Support climate resilience
1. Use anti-icing, pre-wetting, and slurries to optimize removal of snow and ice on roads.	*In Progress*	Ongoing	✓	✓	✓
2. Continue to enhance the use of maintenance decision support technology to assist operators in the removal of snow and ice.	*In Progress*	Ongoing	✓	✓	
3. Use equipment like ice breakers, underbody plows, tow plows, and slurry systems to enhance the removal of ice and snow.	*In Progress*	Ongoing	✓	✓	✓
4. Train drivers on new and existing snow removal techniques.	*In Progress*	Ongoing	✓	✓	✓
5. Research alternative chemicals and equipment innovations to reduce total salt use.	*In Progress*	Ongoing	✓	✓	
6. Continue active salt sustainability/solutions program which brings information to and educates operators on chemical usage and snow/ice strategies.	*In Progress*	Ongoing	✓	✓	
7. Install blowing snow control measures, such as living, structural, and temporary snow fences, and improved road and ditch design.	*In Progress*	Ongoing	✓	✓	✓
8. Design salt storage facilities to minimize impact to local watersheds.	*In Progress*	Ongoing	✓	✓	✓
9. Increase number of facilities for efficient production, storage, and distribution of brine and liquid de-icers.	*In Progress*	Ongoing	✓	✓	✓
10. Modify snow clearing fleet for efficient storage and application of liquid de-icers.	*In Progress*	Ongoing	✓	✓	✓

Roadside Vegetation

METRICS

- Native seeding
- Native planting

Overview

Roadside vegetation plays a vital role in maintaining a safe, resilient transportation system. Benefits of roadside vegetation include improved drainage, erosion control, stormwater treatment, natural cooling, air quality and carbon sequestration. These goals are often achieved effectively by specifying diverse native species that can offer additional benefits including native pollinator and other wildlife habitat and biodiversity conservation.

There is strong institutional and public support for native vegetation along roadsides. This is reflected in Minn. Stat. 160.232 which states, "road authorities are encouraged to utilize low maintenance, native vegetation...," in MN Executive Order 19-28 which states, "[MnDOT] shall manage state-owned transportation properties and rights of way to create, protect, and enhance pollinator habitat," and the Presidential Memorandum of July 20, 2014, which directs the federal DOT to work with state DOTs to promote pollinator-friendly practices. There is also regulatory incentive to use native vegetation under the Endangered Species Act.

MnDOT's Office of Environmental Stewardship provides seeding and planting recommendations through general guidance, project review and project design. Construction staff are responsible for implementing the designs, occasionally making on-site adjustments that might not result in the intended design outcomes. Additionally, purposeful protection of valuable existing resources is emphasized whenever possible during project design and construction. Environmental Stewardship also works with District maintenance staff for the long-term viability of roadside vegetation.

2023 Accomplishments

- Specified 100% native plants in two urban projects.
- In 2023, MnDOT released a new seeding manual that clarifies the standards for seed mixes used in various roadside areas. This update aims to enhance the use of native mixes by minimizing confusion about which mixes are suitable for specific locations.
- Made significant progress on updating standard seed mixes, with an effort to make them more user-friendly for design and construction staff while also improving their function.
- Published Chapter 12 of the Facility Design Guide, which prioritizes native plants for landscape design.

Native vegetation planted on a recent construction project on Highway 95 in Afton. Photo courtesy of Ken Graeve, MnDOT.

DISTRICT IN THE SPOTLIGHT:

Native Landscaping in District 1

MnDOT District 1 completed a project along Trunk Highway 38 in the city of Big Fork which transformed their Main Avenue into an appealing destination on the Edge of the Wilderness Scenic Byway. The project aimed to blend this reconstruction project with the surrounding natural landscape by specifying all native plant materials. Trunk Highway 38, which is the city's Main Avenue, is lined with city services, attractions and businesses, so included improved and continuous pedestrian access routes that trees will shade and provide a welcoming setting for residents and tourists. By adding trees, the project also improves the water quality of the Big Fork and Rice rivers.

Planting native trees along a new sidewalk in Big Fork. Image courtesy of Phillip Zenge, MnDOT.

Planting native trees benefitting all modes and adjacent neighbors. Image courtesy of Phillip Zenge, MnDOT.

The boulevard trees not only beautify the area but also calm traffic by signaling to drivers that they are entering a populated zone, encouraging them to slow down with the visual friction trees provide. The project prioritized native plants, with 100% of the landscaping made up of Minnesota native species, exceeding MnDOT's targets for urban and rural areas. While 38 native trees may not seem like a big project, their impact on the community is expected to be substantial by fostering a sense of place and enhancing the experience for those who walk in Big Fork.

Stormwater management was also a vital component of the project. Green Stormwater Infrastructure (GSI) was retrofitted in a few bump outs and boulevards along Trunk Highway 38 and Main Avenue to help reduce and treat stormwater before reaching the Big Fork and Rice rivers.

Measuring Progress

Figure 15: Native Seeding

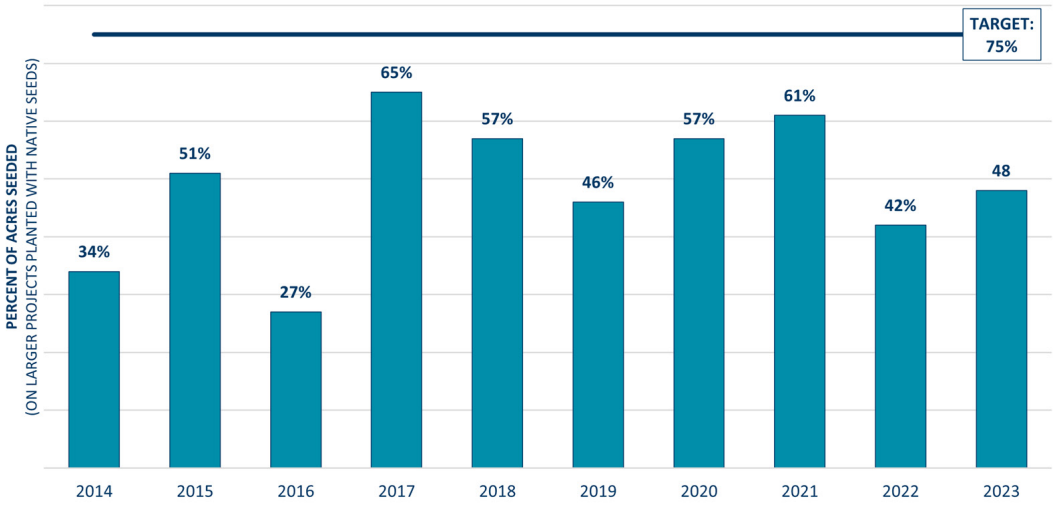


Figure 15: Native Seeding. Source: MnDOT's Office of Environmental Stewardship.

Native Seeding

TARGET: 75% of acres are planted annually with native seeds as part of large MnDOT projects by 2025.

RESULTS: In 2023, 48% of acres on large MnDOT projects were planted with native seeds.

The use of native seeding in MnDOT projects rose from 42% of acres in 2022 to 48% in 2023, marking a 6% increase from the previous year. However, the results still fall short of the target. MnDOT collects native seeding data on all projects rather than focusing specifically on large ones, as stated in the target. The 75% target for all large projects may be unrealistic because different plant species are needed to withstand specific site functions. For example, smaller projects are likely to use more non-native seeding due to MnDOT requirements for boulevards and inslopes. However, large projects that involve grading beyond the inslopes are more likely to use native seeds, which may help to increase the percentage of native seeding over the coming years.

Native Planting

TARGET: 80% of plants on urban projects each year and 90% of plants on rural projects each year are native plant material by 2025. This target isn't 100% because non-invasive, non-native species and cultivars are also used where they are needed to withstand site-specific conditions.

RESULTS: In 2023, 55% of plants on 12 projects were native plant material reflecting a cumulative decrease of 10%. Since this goal was set, native planting increased from 50% of plants in 2021 to 65% of plants in 2022.

Of the twelve 2023 projects evaluated, two were rural projects and each of those exceeded the 90% target by specifying 100% native plants. Four of the ten urban projects also exceeded the 80% target, while six projects did not, indicating the goal is attainable.

Figure 16: Native Planting

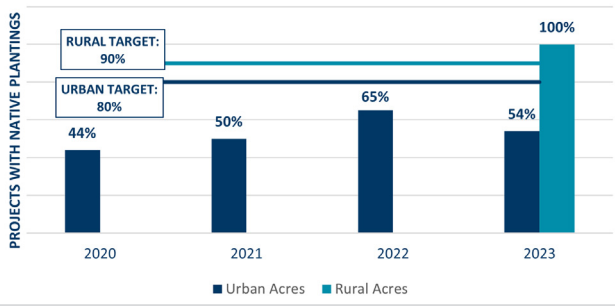


Figure 16: Native Planting. Source: MnDOT's Office of Environmental Stewardship.

2024 Planned Actions Table

The planned actions to support sustainable roadside vegetation have the potential to improve public health by supporting environmental quality. Reducing air and water pollution can improve public health and quality of life. Actions that reduce the vulnerability of infrastructure by supporting stormwater management have the potential to support climate resilience.

			POTENTIAL TO...		
ACTION	**STATUS**	**COMPLETE BY**	**Reduce GHG emissions**	**Improve public health**	**Support climate resilience**
1. Update design and construction standards by rewriting seeding manual.	*Complete (2023)*	2023		✓	✓
2. Revise seed mixes to improve establishment speed of native mixes and increase native components of non-native mixes.	*Revisions in progress based on input from stakeholders*	2024		✓	✓
3. Create four fact sheets on seed mix expectations and establishment needs.	*Complete (2023)*	2023		✓	✓
4. Formulate roadside vegetation vision and goals.	*In Progress*	Ongoing		✓	✓
5. Develop designs emphasizing native plants and seeding (e.g., landscape construction and partnership, bioengineering, negotiated maintenance, living snow fence, visual quality)	*In Progress*	Ongoing		✓	✓
6. Update Facility Design Guide to reflect sustainability objectives for roadside vegetation.	*Complete*	Updates ongoing		✓	✓
7. Implement specialized roadside vegetation management plans for three locations.	*In Progress (One of three implemented)*	Ongoing		✓	✓

2024 Planned Actions Table, continued

ACTION	STATUS	COMPLETE BY	POTENTIAL TO...		
			Reduce GHG emissions	Improve public health	Support climate resilience
8. Explore methods of tracking planting, seeding, and establishment of vegetation; such as GIS transportation asset mapping of construction plans and the collector app.	*In Progress*	Ongoing		✓	✓
9. Investigate MnDOT's process of evaluating topsoil on construction projects from materials recommendations through the design phase to construction.	*In Progress*	TBD; MnDOT staff working on new process and guidance		✓	✓
10. Develop new provision that would create an alternate process for specifying and paying for vegetation establishment on projects, to be tested on construction projects.	*In Progress*	2025		✓	✓
11. Develop methods and materials to encourage Minnesota growers to increase supply of native plants.	*In Progress*	Ongoing		✓	✓
12. Create a Computer-Aided Design (CAD) plant pallet to guide landscape design prioritizing native plants.	*In Progress*	2024		✓	✓

Construction

METRICS

- Sustainable pavements

Overview

MnDOT's construction activities center on creating and maintaining a safe and functional transportation system. Maintaining existing roads is typically less expensive and less impactful to the environment than rehabilitation or reconstruction, as it requires fewer materials, less transportation and reduced processing. Sustainable pavements are materials and techniques used in road construction that aim to minimize environmental impact, make better use of resources and improve the road's durability. Roadway fixes that utilize existing materials have a longer design life and tend to have lower emissions. There are also several cost-effective methods of paving that can reduce greenhouse gas emissions and extend the life of the pavement. MnDOT is actively exploring and adopting these innovative techniques to reduce both environmental and operational impacts.

2023 Accomplishments

- Districts continued to improve pavement preventative maintenance by focusing on early crack treatments and applying thin bituminous surface treatments (BSTs) to extend pavement life and delay costly repairs.
- Continued to use performance measures, including for minor repairs on concrete pavements. These preventive maintenance activities are quicker to perform, therefore minimizing disruption to the traveling public using the roadway while improving pavement smoothness and serviceability. The preventative maintenance performance measures continue to be refined.
- Engaged in MnROAD Research projects around using non-cement materials in paving to reduce carbon.

Construction of unbonded overlay

Completed unbonded concrete overlay

DISTRICT IN THE SPOTLIGHT:

Pavement Project on I-94, Metro District

In April 2023, MnDOT began a pavement project on I-94 in the Metro District which has involved a stretch of approximately 80 lane miles of unbonded concrete overlay, a method frequently used by MnDOT. An unbonded overlay utilizes the existing roadway as the base for the new concrete roadway. Instead of removing and replacing the existing roadway, MnDOT uses what is there and builds the new concrete roadway on top. This approach not only saves time and resources but also improves the overall quality of the roadway.

MnDOT contractors achieved exceptional road smoothness on this project. The smoother pavement results in less fuel consumption and vehicle maintenance. MnDOT offers incentives to contractors to pave a smoother roadway using the International Roughness Index (IRI). The smoother pavement contractors achieve, the more incentive they earn.

Prior to the overlay, one portion of the roadway's IRI measured at 142. After this portion underwent construction, the IRI dropped to 39, indicating a much smoother ride. Using a laser system to assess the IRI, which reflects the driving experience for a sedan, the project demonstrates the value of targeting low IRI values for optimal results. As traffic volumes increase, this smoother surface not only contributes to cost savings but also leads to substantial reductions in greenhouse gas emissions and maintenance expenses.

Left image: Roadway before concrete overlay. Right image: Concrete paving. Images courtesy of Robert Golish, MnDOT.

Measuring Progress

Sustainable Paving Projects

Full -depth reclamation (FDR) and cold in-place recycling (CIR) can lower construction GHG emissions by reducing the amount of paving material that need to be extracted, produced, and transported on site. Stabilized full-depth reclamation (SFDR) produces a stronger roadway base and requires less new asphalt. Additionally, warm-mix asphalt (WMA) reduces energy use because it is produced at a temperature 30F degrees or lower than typical hot-mix asphalt. All techniques extend pavement life, further reducing lifecycle GHG emissions.

MnDOT used sustainable pavement practices on five projects in 2023 (three FDR and two SFDR projects). It should be noted that data for SFDR is not included for years prior to 2023 in the above figure 17. Project volume and project suitability were the primary factors that drove how often these practices were employed. With increased experience using these techniques, districts can implement them more often.

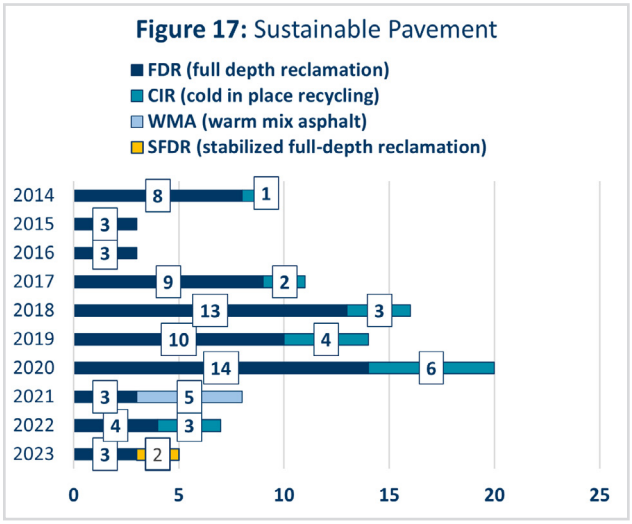


Figure 17: Sustainable Pavement Projects

2024 Planned Actions Table

The following actions are planned for 2024 to increase understanding of sustainable pavement opportunities. Applying learnings from the case studies, environmental product declaration (EPD) information, and peer exchanges will reduce GHG emissions from MnDOT construction projects, improve public health, and support climate resilience.

ACTION	STATUS	COMPLETE BY	POTENTIAL TO...		
			Reduce GHG emissions	Improve public health	Support climate resilience
1. Promote sustainable pavement case studies to MnDOT staff.	*In Progress*	Ongoing	✓	✓	✓
2. Continue to participate in FHWA Sustainable Pavement Peer Exchange.	*In Progress*	Ongoing	✓	✓	✓
3. Conduct research project to increase understanding and use of Environmental Product Declarations across the industry.	*In Progress*	2024	✓		✓
4. Track results of sustainable material test cell projects at MnROAD.	*In Progress*	Ongoing	✓		✓
5. Work with concrete suppliers that reuse water.	*In Progress*	Ongoing	✓		✓
6. Explore workshop or training on sustainable materials for project managers.	*In Progress*	Ongoing	✓		✓

The Road Ahead

Image courtesy of Joel Ulring, MnDOT.

MnDOT is committed to leading by example through internal sustainability efforts.

This report is a snapshot of the important steps we're taking on our journey to meet MnDOT and state enterprise sustainability goals—including progress toward EO 19-27 goals and other sustainability targets set by MnDOT leadership. It's clear we've made important progress, but we also have substantial work ahead of us.

Examples of work planned in 2024:

- **Facilities:** Reduce GHG emissions by retro commissioning existing MnDOT facilities.
- **Fleet:** Continue to develop recommendations to optimize snowplow routes and fuel use.
- **Highway Operations:** Continue to install blowing snow control measures, such as living, structural, and temporary snow fences, and improved road and ditch design.
- **Roadside vegetation:** Revise seed mixes to improve establishment speed of native mixes and increase native components of non-native mixes.
- **Construction:** Conduct research project to increase understanding and use of Environmental Product Declarations across the industry.

Planned actions for each focus area should be updated annually through input and collaboration among subject matter experts from various MnDOT departments.

We'll continue to communicate about efforts by updating this report annually to help us track progress, create accountability and provide transparency. The MnDOT Sustainability and Public Health website is also a place for more frequent updates on our work.

Continuing to make progress toward agency sustainability goals will require us to take more urgent, bolder actions. We look forward to continued collaboration amongst MnDOT staff and with partners in coming years to advance sustainability as part of the agency's strategic direction.