



2021

MNDOT SUSTAINABILITY REPORT

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 with acknowledgment to the MnDOT Sustainable Transportation Steering Committee for their insight, guidance, and support.

Special thanks to Siri Simons and Emily Houser 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 is pleased to present the 2021 Sustainability Report.

Starting in 2022, MnDOT will submit an annual Trunk Highway Performance, Resiliency, and Sustainability report to the Minnesota State Legislature. The report will include information about progress toward sustainability and resilience performance measures for the transportation sector. Given this new legislative reporting requirement, the 2021 MnDOT Sustainability Report will focus on the sustainability of agency operations. In 2023, the agency will review both reports and assess whether adjustments are needed to ensure that comprehensive sustainability and resilience data are available to the public and decision-makers.

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

Strategic Goals

MnDOT's Office of Sustainability and Public Health was created in December 2019. The office's strategic goals are to:

- Reduce transportation carbon pollution.
- Lead by example through MnDOT sustainability efforts.
- Support transportation that improves public health for all Minnesotans.
- Improve resilience of the transportation system in Minnesota.
- Develop strategic external partnerships to expand innovation.

The Office of Sustainability and Public Health leads sustainability and public health planning at MnDOT, but relies heavily on other agencies, external partners, and the public to guide sustainable transportation efforts.

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

- Sustainable Transportation Advisory Council (STAC).
- Governor's Climate Change Subcabinet.
- MnDOT Sustainable Transportation Steering Committee (STSC).

Learn more about collaboration and partnerships later in this report.

How We're Measuring Progress

The 2021 MnDOT Sustainability Report includes information related to our strategic goal to lead by example through MnDOT sustainability efforts. Each section is accompanied by a set of metrics that measure progress toward targets, helping MnDOT make decisions and evaluate the effectiveness of policies, strategies, and investments.

The focus areas include a table of planned actions to help make progress on the targets. These actions will be led and/or supported by the MnDOT Office of Sustainability and Public Health along with other agency partners in 2022. The planned actions tables list actions along with their status, anticipated completion date, responsible entity, and co-benefits. This information helps hold MnDOT accountable while providing another opportunity to garner input and feedback from stakeholders, other Minnesota agencies, and the public.

Where We're at Today

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

While there is still work to be done, we've seen several success stories from MnDOT Districts

around the state. Each section in this report gives a detailed look into additional accomplishments from various focus areas in 2021 with respect to:

- Facilities
- Fleet
- Highway operations
- Roadside vegetation
- Construction

Review the tables below for a summarized look at specific goals and their current status. A green circle (●) indicates a goal has been achieved, while a red square (■) indicates results not yet met.

LEAD BY EXAMPLE THROUGH MNDOT SUSTAINABILITY EFFORTS

CATEGORY	TARGET	PROGRESS TOWARD TARGET (2021)
Facilities GHG emissions	30% reduction from 2005 levels by 2025	38% reduction ●
Energy intensity	30% reduction from 2008 levels by 2025	31% reduction ●
Renewable energy	25% of agency energy needs met using renewable energy by 2025	15% of energy use ■
Water consumption	15% water use reduction from 2017 levels by 2025	17% reduction ●
Municipal solid waste recycling rate	75% recycling and composting rate achieved by 2030	18% recycling rate ■
Fleet GHG emissions	30% emissions reduction by MnDOT vehicles by 2025	12% increase ■
Fleet fossil fuel use	30% reduction in use from MnDOT vehicles by 2025	14% increase ■
Light duty fuel efficiency	30 mpg average fuel efficiency or more achieved by 2025	17 mpg average ■
Electric vehicles (fleet)	100% of MnDOT sedans and SUVs to zero emission vehicles by 2030	2% transition ■
Salt use	200 gallons of liquid per ton of solids (salts) applied annually by 2027	41 gallons of liquid per ton of solids applied annually ■
LED bulb replacement	Convert all lighting on MnDOT roadways to LEDs by 2020	99% complete ●
Native seeding	75% of project acres planted with native seeds by 2025	61% planted ■
MnDOT construction projects GHG emissions	30% reduction from 2018 levels by 2025	Data not yet available

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 forthcoming Trunk Highway Performance, Resiliency, and Sustainability report.



Introduction

2021 in Context

2021 saw the continuation of the global COVID-19 pandemic, but some restrictions were lifted and remote workers returned to working in person as vaccines became available. Meanwhile, we continued to see and feel the effects of climate change, and transportation remained the largest source of greenhouse gas emissions in the U.S.

In late fall 2021, President Biden signed H.R. 3684, the Infrastructure Investment and Jobs Act (IIJA), after months-long negotiations resulting in bipartisan support from the House and Senate.

The IIJA represents a noteworthy investment in all types of infrastructure and is the largest climate and resiliency infrastructure bill in U.S. history.

The IIJA has already begun to impact Minnesota in a significant way. Minnesota's five-year highway apportionment is \$4.8 billion. Core highway programs were retained with additional funding going toward bridge rehabilitation and development. New formula and grant programs in carbon reduction, resiliency, equity, broadband, and electric vehicle charging and fueling infrastructure were also developed because of this funding.

At MnDOT, we lead by example through our agency sustainability efforts. This report tracks progress toward our agency sustainability goals, new planned actions, and areas for improvement. Some areas of our operations showed encouraging progress, while others have room for improvement. Some office staff returned to MnDOT facilities in 2021, but even with more staff onsite, we were able to maintain progress toward energy efficiency targets. Progress toward our fleet targets was



challenging because of financial constraints and supply chain issues continuing to limit the availability of zero-emissions vehicle technology.

As we look ahead to a new year, our agency sustainability efforts are buoyed by the increasing national focus on climate change and resilience signaled by the federal programs included in the IIJA. We are heartened by our continued progress toward our targets and the support of staff from diverse areas of our operations.

ADDITIONAL RESOURCE:

Learn more about the Infrastructure and Investment Jobs Act (IIJA)

■ www.dot.state.mn.us/congressional/iija

MnDOT and the Infrastructure and Investment Jobs Act (IIJA)

On November 15, 2021, President Biden signed the Infrastructure and Investment Jobs Act (IIJA) into law. This bipartisan developed bill is a transformational five-year surface transportation reauthorization bill (P.L. 117-175) with higher funding levels and many new formula and discretionary grant programs that will support the resiliency of transportation infrastructure and address health and community-driven outcomes.

Minnesota's five-year highway apportionment is \$4.8 billion.

- Core highway programs were retained (IMHP, STP, HSP, CMAD) with another \$300 million over five years in formula bridge money
- 90% of highway funding provided to states via formula programs
- New formula and grant programs: carbon reduction, resiliency, equity, broadband, electric vehicle and charging and fueling infrastructure

Projects

- [July 2022 State Transportation Investment Program \(STIP\)](#)
- [Notice of discretionary grants](#)

Other modes and plans, statewide

- [Transit and Active Transportation](#)
- [Bicycling](#)
- [Energy and Air Quality](#)

Contact

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Guiding Statutes and Executive Direction

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

☐ **MINN. STAT. 216H:**

Greenhouse Gas Emissions

In 2007, the state passed the bi-partisan Next Generation Energy Act (NGEA), which established goals for the state to reduce greenhouse gas emissions by 15% below 2005 levels by 2015, 30% by 2025, and 80% by 2050. However, the state did not meet the 2015 goal and is not on track to meet our future goals. Transportation became the largest emitter of carbon pollution in the state in 2016.

☐ **MINN. STAT. 174.01:**

Department of Transportation Creation

MnDOT has 16 goals defined in statute (174.01) that guide agency work to create an integrated multimodal transportation system in Minnesota. A number of these goals directly relate to advancing sustainability and public health:

- (10) to ensure that the planning and implementation of all modes of transportation are consistent with the environmental and energy goals of the state;
- (11) to promote and increase the use of high-occupancy vehicles and low-emission vehicles;
- (13) to increase use of transit as a percentage of all trips statewide by giving highest priority to the transportation modes with the greatest people-moving capacity and lowest long-term economic and environmental cost;
- (14) to promote and increase bicycling and walking as a percentage of all trips as energy-efficient, nonpolluting, and healthy forms of transportation;
- (15) to reduce greenhouse gas emissions from the state's transportation sector; and
- (16) to accomplish these goals with minimal impact on the environment.

☐ **EXECUTIVE ORDER 19-37:**

Establishing the Climate Change Subcabinet and the Governor's Advisory Council on Climate Change to Promote Coordinated Climate Change Mitigation and Resilience Strategies in the State of Minnesota

In 2019, Governor Walz signed Executive Order 19-37 to address the size and scope of the climate crisis, rally the resources of state government, and push the state forward on climate action. The executive order describes the existential threat of climate change to all Minnesotans, including risks for our health and wellbeing, natural resources, and our economy and ways of life. It also highlights that significant disparities exist in Minnesota and that existing disparities mean climate risks are not distributed equally; some communities bear a disproportionate burden of the negative impacts. Therefore, we must consider differences based on race, gender, geography, and economic status and make sure Minnesota's climate solutions consider equity, respond to community needs, and bring benefits to all Minnesotans. EO 19-37 established the Climate Change Subcabinet and the Governor's Climate Change Advisory Council to address these issues.

EXECUTIVE ORDER 19-27:

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

Executive Order 19-27 requires MnDOT to report and make progress on six sustainability goals:

- **Reduce fleet fossil fuel consumption:** 30% reduction of state fleet consumption of fossil fuels by 2027 relative to a 2017 adjusted baseline.
- **Reduce water consumption:** 15% reduction of water use by 2025 relative to a 2017 adjusted baseline.
- **Sustainable Procurement:** 25% of total spend on priority contracts are sustainable purchases by 2025.
- **Reduce greenhouse gas emissions:** 30% reduction of greenhouse gas emissions by 2025 relative to a 2005 calculated baseline.
- **Reduce energy consumption:** 30% reduction in consumption of energy per square foot by 2027 relative to a 2017 adjusted baseline.
- **Reduce solid waste:** 75% combined recycling and composting rate of solid waste by 2030.

Collaboration and Partnerships

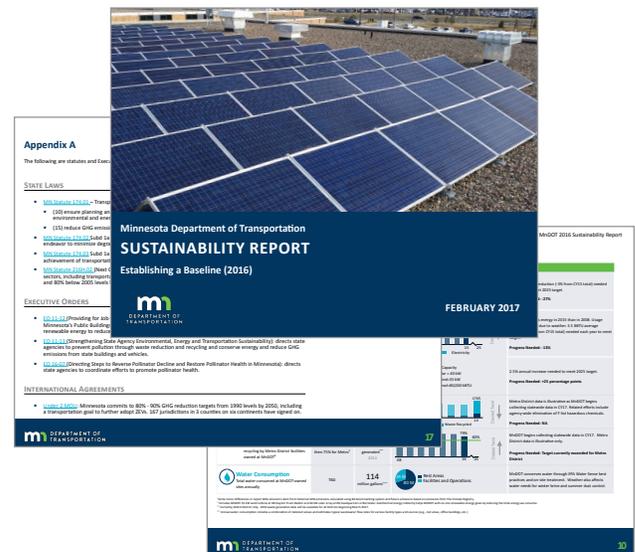
The Office of Sustainability and Public Health leads sustainability and public health planning and coordination at MnDOT, but progress hinges on involvement from staff across the agency. MnDOT also relies on partnerships with other state agencies, regional and local partners, and the public to set sustainability and public health strategies for the agency to implement. In addition to the key groups listed below, the Office of Sustainability and Public Health collaborates with topic-specific internal workgroups and broader national coalitions to guide agency sustainable transportation efforts.

Internal Stakeholders

SUSTAINABLE TRANSPORTATION STEERING COMMITTEE

The internal MnDOT Sustainable Transportation Steering Committee (STSC) was created in 2016 to provide leadership, strategic direction, and oversight for high-priority natural resource issues and agency-wide environmental sustainability agency activities, including greenhouse gas mitigation, climate adaptation, and promoting public health and healthy communities.

The STSC helps identify agency sustainable transportation priorities and performance indicators. Members support sustainable transportation communications to ensure agency-wide understanding and adherence to sustainable transportation policies, guidance, and direction. The STSC also coordinates and supports other agencies and the Governor's office on statewide sustainability efforts.



Pages from the first Sustainability Report commissioned by the STSC in 2016

External Stakeholders

SUSTAINABLE TRANSPORTATION ADVISORY COUNCIL

The [Sustainable Transportation Advisory Council \(STAC\)](#) makes recommendations to the MnDOT Commissioner to help the agency reduce carbon pollution from the transportation sector in Minnesota, consistent with the MnDOT statutory goals outlined in Minn. Statute 174.01, the Next Generation Energy Act, and the annual MnDOT Sustainability Report.

The STAC is a type of long-form public engagement. STAC workgroups develop recommendations that prioritize climate action and equity.

The goal of the STAC is to help Minnesota transition to a low-carbon transportation system consistent with statutory goals for energy and emissions reductions to maximize benefits to Minnesota, while recognizing the importance of improving safety, reducing inequities, and supporting economic development.



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 back on track to meet or exceed the Next Generation Act goals to reduce greenhouse gas 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 these complex issues.
- 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 help identify the most effective policies and strategies, state leaders created action teams to bring together subject matter experts across state agencies and gather deep knowledge about different sectors of our economy and society and the challenges and opportunities each faces from climate change. Action teams engage with thought leaders, community groups, and other stakeholders to initiate new relationships, build upon existing ones, and actively seek input and feedback on climate policy solutions.

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

- **Climate Engagement Team:** Executive Order (EO) 19-37 calls for the Climate Change Subcabinet to conduct extensive engagement with Minnesotans to identify opportunities to reduce emissions and build resiliency in our communities. The Climate Engagement Team is co-led by the Minnesota Environmental

Quality Board, the Minnesota Pollution Control Agency, and MnDOT, and tracks engagement activities to coordinate the various levels of engagement happening within the Subcabinet structure.

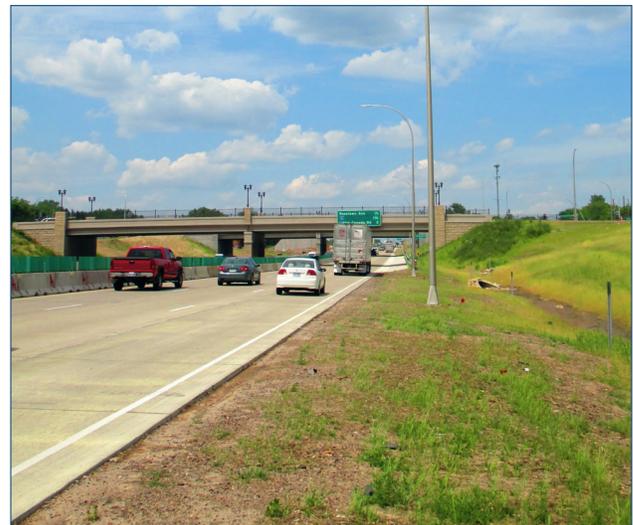
- **Transportation Action Team:** MnDOT leads the Transportation Action Team to identify strategies to address climate change and decarbonize the transportation sector in Minnesota. Examples of work include developing recommendations for transportation policies and other strategies for the Clean Transportation section of the state [Climate Action Framework](#).
- **Resilience and Adaptation Action Team:** MnDOT participates on the Resilience and Adaptation Action Team that leverages a pre-existing inter-agency team to identify the policies and strategies that build resiliency and adaptation called for in EO 19-37.

Strategic Partnerships

MnDOT launched a Strategic Partnerships program in 2021 to expand opportunities to collaborate with external groups on climate action, public health, quality of life, and transportation equity. Strategic coordination and partnerships with external groups will improve our ability to work and build trust with the private sector, nonprofits, community organizations, the public, and other agencies in these priority areas.

ADVANCING CLEAN ENERGY AND CONNECTIVITY PROJECTS THROUGH NEXT GENERATION HIGHWAYS COLLABORATION WITH THE RAY AND NGI CONSULTING

In 2021, MnDOT joined a feasibility assessment to evaluate technical and regulatory considerations for Next Generation Highways—highways that strategically co-locate buried high-voltage direct current (HVDC) transmission lines with broadband in highway right of way. Through its Next Generation Highways work, MnDOT is evaluating whether existing highway right of way can be used to accelerate the siting and permitting of new buried transmission lines.



The analysis has underscored the need for coordination among other state agencies including the Public Utilities Commission and the Minnesota Department of Commerce. MnDOT is evaluating how its jurisdictional authority over highway right of way interacts with the transmission siting and permitting process conducted by the PUC and Department of Commerce. The **NextGen Highways Feasibility Study: Buried High-Voltage Direct Current Transmission** report was released in April 2022. The next phase of this work includes more coordination with statewide broadband expansion plans, updates to MnDOT utility accommodation policies and process, and analysis of priority corridors to pilot the co-location of fiber with buried HVDC transmission lines.

ADVANCING MNDOT'S MISSION THROUGH CREATIVE PROJECTS IN PARTNERSHIP WITH SMART GROWTH AMERICA

MnDOT's Artist in Residence program is funded by Transportation for America and managed by Jessica Oh, the Strategic Partnerships Director in the Office of Sustainability and Public Health. Marcus Young 楊墨, a behavioral artist, led the Council of Old and New Wisdom, a discussion group that allowed participants to speak plainly with profound common sense about transportation challenges and opportunities ahead.

This group included representation across race, class, gender, and geography. The project centered voices from the Black and Indigenous communities to address those who have endured the most harm throughout American history, recognizing stolen land and labor, and with awareness that the path to liberation for those communities is the path to liberation for all. The goal was to facilitate intimate conversations to provide guidance and material for the creative and artistic expression as part of the [Statewide Multimodal Transportation Plan](#)—the highest level transportation policy plan for the state.

PUBLIC PRIVATE PARTNERSHIPS TO BENEFIT COMMUNITIES: NLG PILOT PROJECT IN MINNEAPOLIS SUPPORTS PUBLIC HEALTH AND ECONOMIC DEVELOPMENT

Right of way is any DOT’s most valuable asset, and requests for new uses to support community, equity, economic development, or sustainability goals are increasing. Since 2018, MnDOT has worked with a developer to explore a public

space pilot project adjacent to Target Field in downtown Minneapolis in MnDOT right of way. The resulting public-private partnership will allow significant private investment to create public plaza with a great lawn, stage, dog exercise area, public exercise equipment, and gathering spaces in a large under-bridge area. The space will be an intentionally programmed public space with regular community events, fairs, philanthropic events, and seasonal recreation activities. This project required policy shifts at MnDOT, and additional analysis of community benefits, risk assessment, and evaluation of alternative uses of right of way. This case study showcases MnDOT’s new policy on Commercial Activity in the Right of Way, and highlights from the four legal agreements for this project including an airspace lease and catchment system.

➤ ADDITIONAL RESOURCES:

Learn more about the STAC

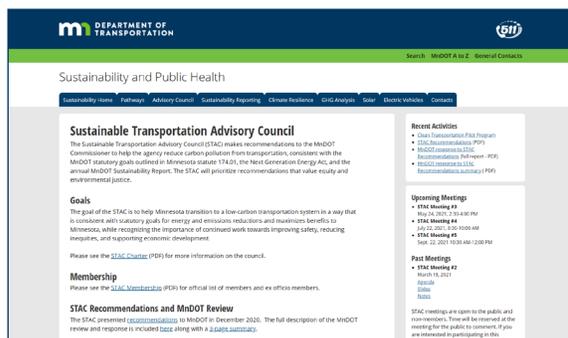
- www.dot.state.mn.us/sustainability/advisory-council.html

Learn more about the Governor’s Climate Change Subcabinet and Minnesota’s Climate Action Framework

- climate.state.mn.us/minnesotas-climate-action-framework

Learn more about statewide electric vehicle infrastructure planning

- www.dot.state.mn.us/sustainability/electric-vehicles.html



Reporting Framework

The annual MnDOT Sustainability and Public Health Report is developed by the agency's [Office of Sustainability and Public Health](#).

It is organized to align with the focus areas identified in the [Sustainability and Public Health 2020 Strategic Plan](#).

Each content section begins with an overview of the focus area, a collection of recent accomplishments, and a success story from within 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 and 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 Office of Sustainability and Public Health 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 Office of Sustainability and Public Health 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 emissions
- Energy intensity
- Renewable energy
- Water consumption
- Municipal solid waste recycling rate

Overview

MnDOT is committed to using resources efficiently at agency owned and operated facilities. The agency owns over 1,000 buildings totaling over 6.2 million square feet. Operating facilities consume energy, water, and waste. Executive Order 19-27 directs state agencies to use 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 reduce energy use at agency owned facilities.

Water

Water is used for plumbing and irrigation at MnDOT facilities. Reducing water offers many benefits, including lower energy and costs, less wear and tear on equipment, less treated wastewater being discharged into the watershed, and an increased resiliency in our wastewater system to handle extreme climatic events.

Waste

MnDOT office workers create municipal solid waste (e.g., paper, cans, cardboard) and specialty waste (e.g., fluorescent lightbulbs, motor oil). MnDOT facilities offer recycling and trash collection for staff and visitors and encourage recycling of specialty waste whenever possible.

2021 Accomplishments

- Installed the agency's first solar array in Otter Tail Power service territory, a 150 kW array in Morris, Minnesota.
- Continued to implement temperature set point standards.
- Continued retro-commissioning efforts.
- Issued RFP for community solar garden subscriptions for Metro District facilities.
- Upgraded building automation systems, including at Oakdale Headquarters.



📷 A hot water pressure washer used to reduce water use when washing equipment

💡 DISTRICT IN THE SPOTLIGHT:

District 4 Installs 150 kW Solar Array



MnDOT District 4 installed a solar array in Morris, Minnesota. The district worked with MnDOT Building Services and Sustainability and Public Health staff to develop a comprehensive plan for energy efficiency and renewable energy in 2020. One of the first action steps in the plan was to explore installing solar panels at the district headquarters facility in Morris.

With support from MnDOT Building Services and Sustainability and Public Health staff, the district used the state master solar contract to request proposals for the project during the summer of 2021. The district worked with a solar vendor to install a ground-mounted 150 kW array in November 2021.

The array will produce an estimated 193,000 kWh annually, which is about 85% of the facility's annual electric consumption, saving approximately \$18,000 and avoiding 200,000 pounds of CO₂e emissions per year.



© Solar array installed in November 2021 at MnDOT Morris headquarters

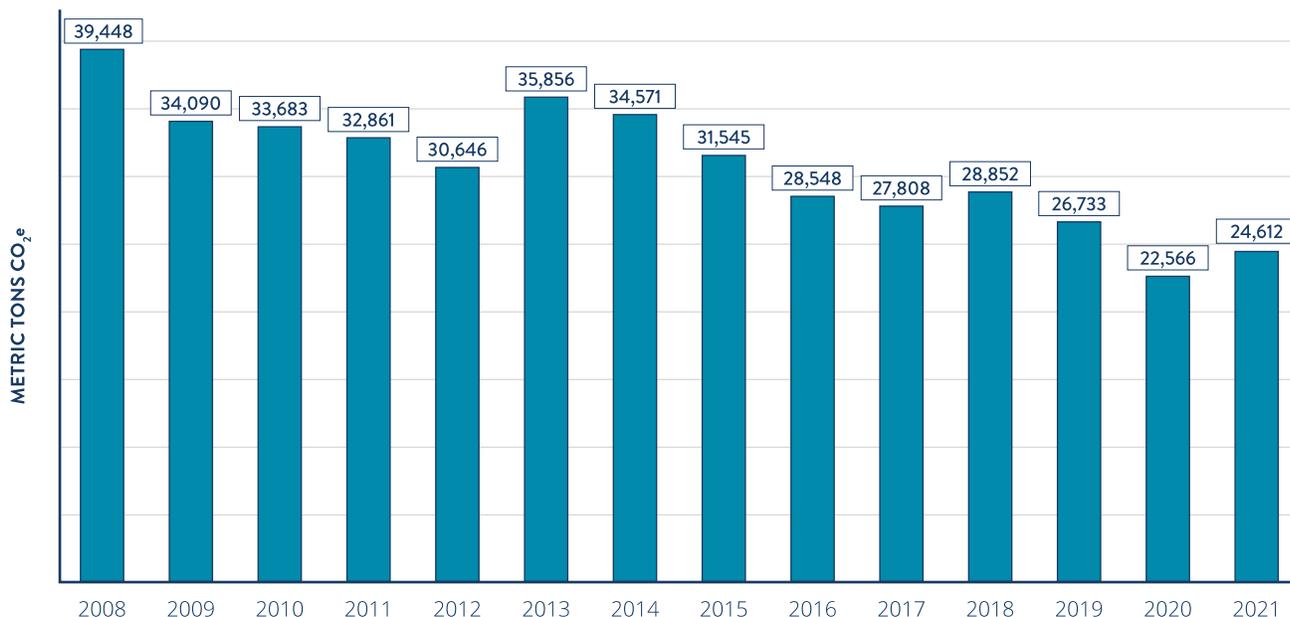
BENEFITS OF THE SOLAR ARRAY INCLUDE:

- Reduced greenhouse gas emissions.
- Meets facility energy needs.
- Lower long-term electricity costs at the facility.
- Increased resilience to power outages.

The solar array is MnDOT's first installation in Otter Tail Power service territory. The project will serve as a model for future projects at MnDOT facilities in Greater Minnesota.

Measuring Progress

Figure 1: Facility GHG Emissions



Facilities Greenhouse Gas Emissions

🎯 **TARGET:** Reduce greenhouse gas emissions by 30% from 2005 levels by 2025

✅ **RESULTS:** Between 2008 and 2021, the agency reduced greenhouse gas emissions from MnDOT owned and operated facilities by 38%.

Between 2008 and 2021, the agency reduced greenhouse gas emissions from MnDOT owned and operated facilities by 38%. A cleaner electricity grid, energy efficiency projects, and renewable energy projects drove the improvements between 2008 and 2020. During that time, statewide average energy grid intensity improved by approximately 30%. Between 2020 and 2021, greenhouse gas emissions from MnDOT facilities remained the same. Additional details about these factors are provided above.

Energy Intensity

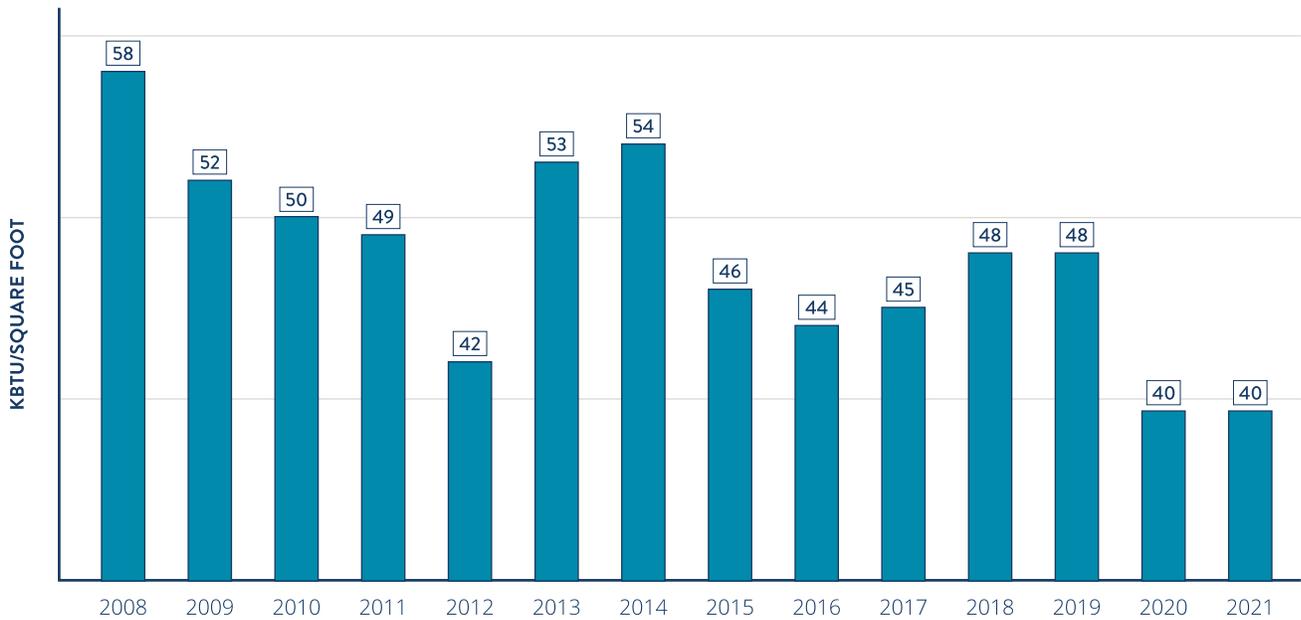
🎯 **TARGET:** Reduce energy intensity by 30% from 2008 levels by 2025

✅ **RESULTS:** Between 2008 and 2021, the agency reduced energy intensity by 31%.

Between 2008 and 2021, the agency reduced energy intensity, or energy consumption per square foot by 31%. Energy efficiency projects drove the improvements between 2008 and 2020. Between 2020 and 2021, facility energy intensity remained the same as 2020 at 40 KBTU/square foot because of energy efficiency improvements, mild weather, and continued teleworking. In 2021, the agency continued to implement energy efficiency projects.

MnDOT has 137 truck stations across the state. In 2021, truck station energy use remained unchanged so that essential workers could continue to conduct operations and maintenance work. Teleworking contributed to significant

Figure 2: Energy Intensity



energy reductions from plug loads and lighting in office areas, with many staff members continuing to work from home in 2021 because of COVID-19. MnDOT continued to run heating ventilation and air conditioning (HVAC) systems in mostly unoccupied buildings based on guidance from the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) for safe building operations during the pandemic.

As staff return to the office, MnDOT will work to support teleworking opportunities that can help to maintain a lower energy intensity level.

Renewable Energy

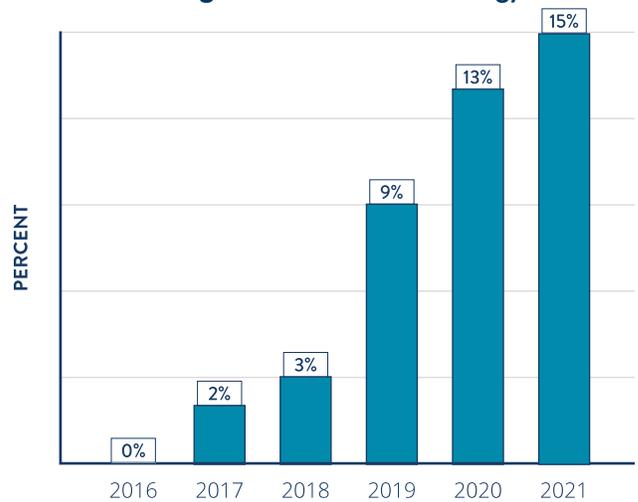
🎯 **TARGET:** Subscribe to or use renewable energy to meet 25% of agency energy needs

✅ **RESULTS:** In 2021, MnDOT subscribed to or used renewable energy equivalent to 15% of total agency energy use.

MnDOT has on-site solar energy and community solar garden subscriptions that met 15% of energy needs at agency facilities in 2021. The agency made noteworthy progress on the renewable target in 2019 by subscribing to two community solar gardens for 6.6 million kWh of

electricity annually. In 2020, MnDOT worked with a solar developer to install a one MW community solar garden at a former gravel pit in Afton, Minnesota. In 2021, MnDOT installed a ground-mounted 150 kW array in Morris.

Figure 3: Renewable Energy



Water Consumption

🎯 **TARGET:** Reduce water use by 15% from 2017 levels by 2025

✅ **RESULTS:** Between 2017 and 2021, MnDOT reduced water use at agency owned and operated facilities by 17%.

Between 2017 and 2021, MnDOT used 17% less water at agency owned and operated facilities. Building closures, fixture replacements, and operational changes due to COVID-19 drove a significant change in water use between 2019 and 2020. In 2020, approximately 70% of MnDOT facilities used less water than in 2019. As staff returned to agency facilities in 2021 and MnDOT increased liquid brine production, water use increased. MnDOT is working to support teleworking opportunities and implement water conservation measures that can help to maintain efficient water use at MnDOT facilities.

Minnesota’s water resources are vital to the people and economy of the state. Making roads safe for motorists remains MnDOT’s first concern and all parties involved in winter maintenance must learn to continuously consider environmental impacts and reduce chloride use wherever possible. The agency is increasingly blending liquid salt brine with alternative chemicals, such as calcium chloride, to reduce negative impacts on water quality from salt. Liquid brine use increased from 6.5 million gallons in state fiscal year 2020 to 8.1 million gallons in state fiscal year 2022. When placed at the recommended rate, a gallon of liquid salt brine uses approximately 70% less rock salt compared to using rock salt alone. While liquid brine production increases water use, the corresponding reduction of salt provides significant water quality benefits.

Figure 4: Water Consumption



Municipal Solid Waste Recycling Rate

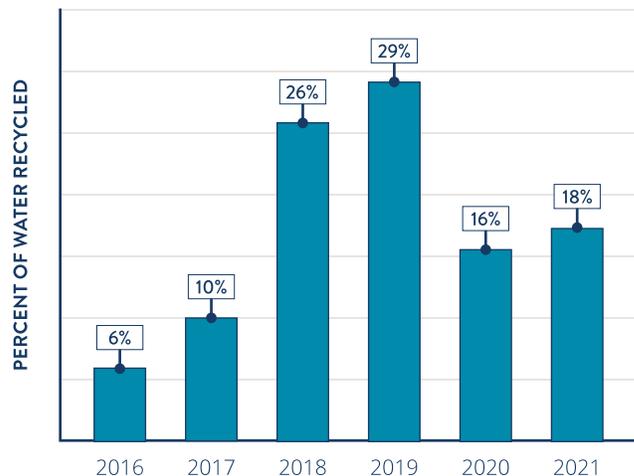
🎯 **TARGET:** Achieve 75% recycling and composting rate by 2030

✅ **RESULTS:** In 2021, MnDOT’s Municipal Solid Waste recycling rate increased to 18%.

The Municipal Solid Waste recycling rate at MnDOT facilities increased from 16% in 2020 to 18% in 2021, down from a high of 29% in 2019. In 2020 and 2021, some employees were teleworking, so the total amount of waste produced was less, but the diversion rate was lower. This may be due in part to the reduction in printing and recycling of office paper while employees were not in the office. The recycling rate is higher at MnDOT headquarters and truck stations than rest areas.

As staff return to the workplace, there is an opportunity to reengage employees about recycling benefits and best practices, and to refresh or amend existing recycling processes (e.g., by adding organics recycling in areas where there are haulers and commercial composting facilities). There may not be recycling or composting haulers or facilities in all parts of the state, but there is an opportunity to explore expanding these practices where they are available.

Figure 5: MSW Recycling Rate



2022 Planned Actions Table

Many of the planned actions have the potential to reduce greenhouse gas 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.

ACTION	STATUS	COMPLETE BY	POTENTIAL TO...		
			Reduce GHG emissions	Improve public health	Support climate resilience
1 Develop facility energy plans for two additional MnDOT Districts that identify energy efficiency and renewable energy projects	 NOT STARTED	End of 2022			
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			
5 Pilot organics recycling at MnDOT facilities in Greater Minnesota	 NOT STARTED	End of 2022			
6 Evaluate opportunities to expand organics recycling at Metro District facilities	 IN PROGRESS	Summer 2022			
7 Implement water fixture improvements in the 2018 Facility Water Reduction Assessment	 IN PROGRESS	Ongoing			
8 Add urinals to reduce water use in bathrooms as they are updated	 IN PROGRESS	Ongoing			
9 Add water conservation measures in new building construction and existing building renovation	 IN PROGRESS	Ongoing			

Fleet



METRICS

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

Minn. Stat. 16C.137 calls for state departments, whenever legally, technically, and economically feasible, subject to the specific needs of the department and responsible management of agency finances, to ensure that all new on-road vehicles purchased, excluding emergency and law enforcement vehicles, use “cleaner fuels,” have fuel efficiency ratings over 30 miles per gallon for city usage or 35 miles per gallon for highway usage, or are powered solely by electricity.

Overview

MnDOT uses a variety of vehicles and fuels to perform maintenance, delivery, transportation, assessment and provide services for the safety of the traveling public. The agency used more than 4,600 vehicles in 2021, including over 1,200 light duty vehicles (140 sedans, 144 SUVs, 88 vans, and 891 pick-up trucks), over 2,100 medium- and heavy-duty vehicles, and over 1,200 off-road vehicles. MnDOT remains committed to reducing fossil fuel use from MnDOT fleet vehicles.

2021 Accomplishments

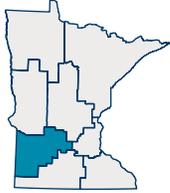
- Successfully piloted lower-carbon biodiesel, saving the agency 2,541 gallons of fossil fuel.
- Created an interactive dashboard that allows MnDOT Districts to save fuel and money by tracking and reducing unnecessary idling by agency fleet vehicles.
- Ordered agency’s first all-electric pick-up truck, a Ford Lightning for MnDOT District 6 in Southeastern Minnesota.



📷 A plug-in hybrid electric vehicle and a battery electric vehicle charge in a motor pool garage

💡 DISTRICT IN THE SPOTLIGHT:

District 8 Pilots Lower-Carbon Diesel Fuel



MnDOT District 8 successfully used lower-carbon diesel fuel between July and October 2021. MnDOT currently uses at least 20% biodiesel (B20) from April to September based on the minimum standards in Minn. Stat. 239.11.¹ However, it is possible to use lower-carbon diesel fuel in the summer months. Lower-carbon diesel fuels like B30 and B50² help MnDOT reduce carbon pollution from fleet vehicles while supporting the agricultural economy in Minnesota.³

To prepare for the pilot, the District 8 Fleet Manager worked with Beaudry Oil and Propane, MnDOT Office of Sustainability and Public Health, MEG Corp, Minnesota Pollution Control Agency, and the Minnesota State Fire Marshal's Office to obtain the fuel and ensure that it was compatible with the district's fueling equipment and vehicles.

THE PILOT PRODUCED IMPRESSIVE RESULTS:

- District 8 fleet vehicles used approximately 4,860 gallons of B29 and 7,012 gallons of B50.
- The pilot achieved approximately 2,541 gallons of fossil fuel savings.
- The vehicles used 27% less fossil fuel than average.
- There were no fuel-related issues in vehicles using the lower-carbon diesel fuel.



📷 A single axle plow truck, one of the pieces of equipment that used the B50 biofuel blend during the summer 2021 pilot

Given the success of the pilot, MnDOT is exploring using lower-carbon diesel fuel in agency owned bulk tanks from May through September, pending temperature constraints. Using up to B50 in MnDOT fleet vehicles during the summer months is a cost-effective way to save up to 5% of annual agency fleet fossil fuel use and greenhouse gas emissions.

¹ [Minn. Stat. 239.77 Biodiesel Content Mandate](#)

² B30 is 30% biodiesel and B50 is 50% biodiesel

³ [Benefits of biofuel production and use in Minnesota, US Department of Energy](#)

Measuring Progress

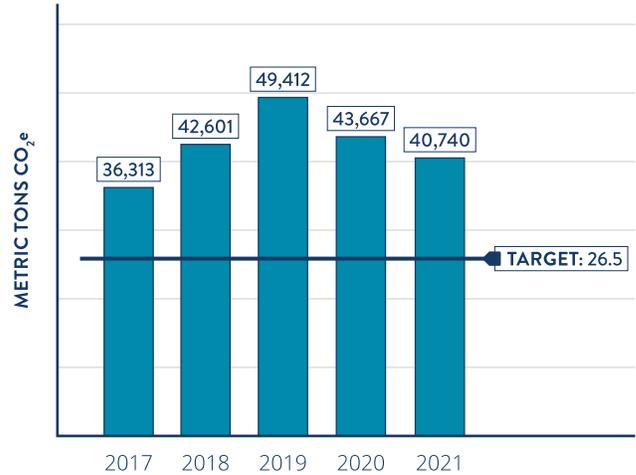
Fleet Greenhouse Gas Emissions

🎯 **TARGET:** Reduce greenhouse gas emissions from fuel used by MnDOT vehicles 30% from 2017 levels by 2025

✅ **RESULTS:** Fleet greenhouse gas emissions have increased by 12% since 2017.

Between 2017 and 2021, fleet greenhouse gas emissions increased by 12%. MnDOT generated 8% less greenhouse gas emissions from fleet in 2021 compared to 2020. Greenhouse gas emissions were lower because the agency used less fossil fuel.

Figure 6: Fleet GHG Emissions



MnDOT fleet vehicles used 12% less fossil fuel in 2021 compared to 2020, reversing the multi-year trend of increased fossil fuel use.

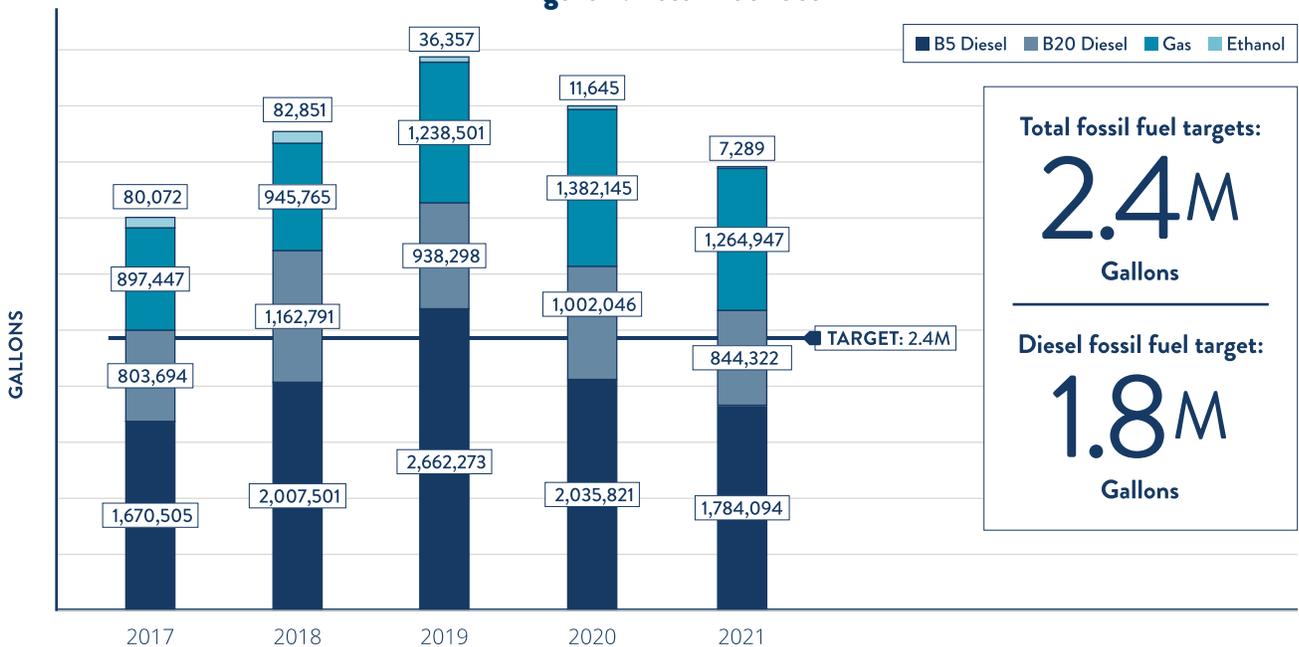
Heavy-duty vehicles drove the reduction, using less fuel in 2021 than 2020. Part of this is likely due to the less severe winter and fewer construction projects. Light-duty vehicles used less fuel in 2021 than 2020.

Fleet Fossil Fuel Use

🎯 **TARGET:** Reduce fossil fuel use from MnDOT vehicles by 30% from 2017 levels by 2025

✅ **RESULTS:** Between 2017 and 2021, fossil fuel use by MnDOT vehicles increased 13%.

Figure 7: Fossil Fuel Use



Light Duty Fuel Efficiency

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

📊 **RESULTS:** In 2021, the average light duty fuel efficiency of vehicles in the MnDOT fleet was 17 mpg.

Light-duty fuel efficiency remained constant at 17 miles per gallon (mpg).

Light-duty fuel efficiency is a measurement based on the fuel efficiency of MnDOT sedans, SUVs, vans, and pick-up trucks that weigh less than 8,500 lbs.

WEIGH LESS THAN <8,500 lbs



Figure 8: Light Duty Fuel Efficiency



Light duty pick-up trucks made up 81% of the MnDOT light duty vehicle miles traveled in 2021. Pick-up trucks traveled nearly the same distance in 2021 as in 2020, but the average fuel efficiency across this segment of the fleet increased from 15.9 mpg to 16.8 mpg.

The sedans used in 2021 had an average fuel efficiency of 30.7 mpg compared to 30 mpg in 2020. The vehicle life cycle for sedans in the MnDOT fleet is eight years and as light-duty vehicles are replaced with electric options, fuel efficiency will improve. Behavior changes like eliminating unnecessary idling can support immediate improvements to vehicle fuel efficiency.

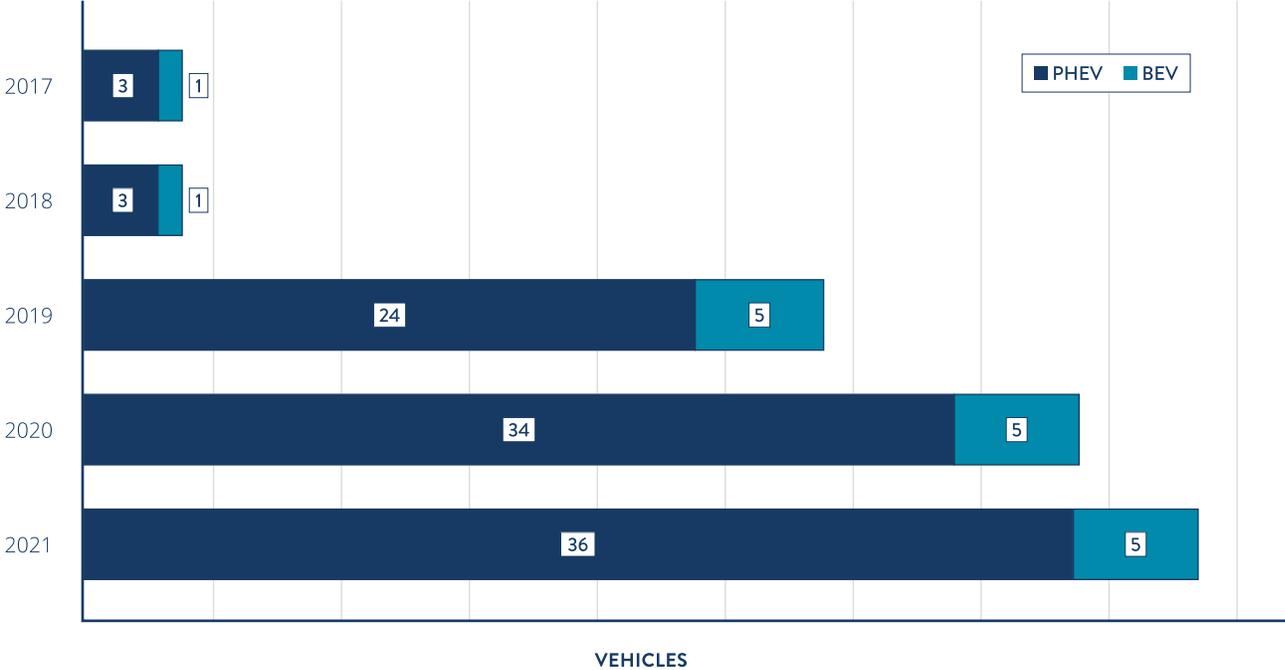
Electric Vehicles

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

📊 **RESULTS:** In 2021, 2% of the sedans and light-duty SUVs in the MnDOT fleet were zero emission vehicles.

MnDOT added two plug-in hybrid electric vehicles to the fleet between October 2020 and June 2021. The agency purchased a few vehicles in 2021 that could have been electric if EV chargers were available at their home facilities. This challenge will be addressed as MnDOT expands EV chargers at agency facilities. EVs, including PHEVs, account for 15% of the 250 sedans and light-duty SUVs in the MnDOT fleet.

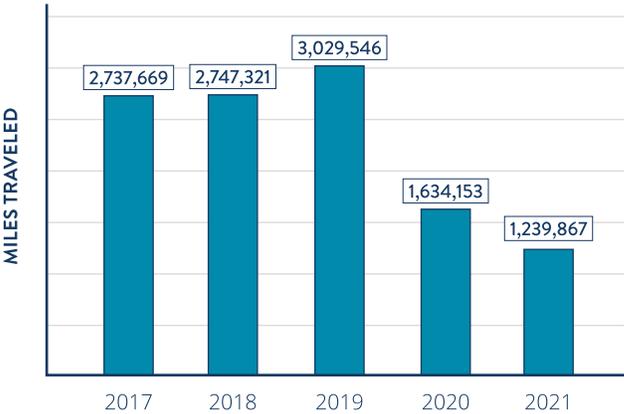
Figure 9: Fleet Electric Vehicles



Employee-owned Auto Mileage

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 virtual meetings. Employee-owned auto mileage dropped by 24% between 2019 and 2020, primarily due to COVID-19. This trend continued in 2021, with employee-owned auto mileage remaining low.

Figure 10: Reimbursable Employee-Owned Auto Mileage



2022 Planned Actions Table

The following actions are planned for 2022 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.

ACTION	STATUS	COMPLETE BY	POTENTIAL TO...		
			Reduce GHG emissions	Improve public health	Support climate resilience
1 Install 43 EV chargers at MnDOT facilities for agency fleet vehicles and visitors on official state business	 IN PROGRESS	Fall 2022			
2 Continue to track and communicate flags to District staff to eliminate unnecessary idling	 IN PROGRESS	Ongoing			
3 Apply for grant funding to upgrade bulk fuel dispenser for compatibility with up to B100	 IN PROGRESS	December 2022			
4 Pilot two Ford Lightning pick-up trucks in MnDOT fleet	 IN PROGRESS	December 2022			
5 Partner with Xcel Energy and Sawatch to electrify MnDOT vehicles and address charging needs	 IN PROGRESS	Phase 1: Summer 2022 Phase 2: April 2023			
6 Develop recommendations to optimize snowplow routes and fuel use	 IN PROGRESS	TBD			

Highway Operations



METRICS

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

Overview

MnDOT strives to meet the public and economic demands for safe winter driving conditions. Historically, MnDOT worked with national partners to develop and use technology including the Maintenance Decision Support System and Mobile Data Collection to identify optimal salt/chemical use. The agency aims to use no more than the recommended salt use suggested by MDSS.

MnDOT's salt sustainability efforts include using liquid chemical deicers (in addition to salt or sand), plows to reduce the amount of salt needed, and research to identify alternative deicers. MnDOT also uses mobile observations to optimize salt use and blowing snow control measures such as 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.



Ⓜ The Pauselli machine is a self-propelled pile driver used to install galvanized sleeves into the ground that support snow fence posts.

2021 Accomplishments

- Increased use of liquids and brine to substantially reduce the amount of salt used in snow removal.
- Designed salt storage facilities to minimize impact to local watersheds.
- Achieved 99% LED bulb conversion.

💡 DISTRICT IN THE SPOTLIGHT:

Metro District achieves 100% LED roadway lighting conversion



MnDOT uses Light Emitting Diode luminaires as a standard light source for most of our roadway lighting. High Pressure Sodium luminaires have been replaced throughout the state with LED luminaires and will continue to be replaced as funding becomes available.

MnDOT's Metro District completed its conversion from High Pressure Sodium luminaires to LED technology for roadway lighting. LED luminaires use 35-75% less energy than HPS lamps.

LED luminaires also have a longer lifespan (15-17 years, compared to 4-5 years for HPS lamps). This means that they need to be replaced less often, reducing the frequency of maintenance trips needed.

Because of the LED luminaire conversion, MnDOT saves up to \$2 million per year statewide on electricity for lighting and over \$500,000 per year on lighting maintenance. Metro District saves approximately \$1.3 million annually on electricity, and substantial additional savings on maintenance costs.

BENEFITS OF LED ROADWAY LIGHTING:

- Decreased life-cycle cost.
- Decreased energy consumption (35%-75% depending on luminaire type).
- Longer lasting (17-20-year lifespan).
- Decreased maintenance costs.
- Improved worker safety (fewer trips to the roadway for maintenance).
- Increased driver and pedestrian safety (fewer outages due to improved reliability).
- Potential for energy rebates from power companies.
- Improved color rendering index better allows identification of object colors.
- Based on life-cycle costs, the payoff occurs between 4-5 years from conversion.
- Using existing fiber-optic network, LED control systems can be deployed to monitor energy use, report outages, utilize dimming or on/off control at non-peak times to further reduce energy consumption.



📷 LED luminaire installed on a light post on MnDOT right of way

Measuring Progress

Reduction in Total Salt Applied to Roadways

Rate 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 2020-21, 41 gallons of liquid were applied per ton of solids applied.

During Minnesota winters, salt plays a key role in providing safety and mobility for the traveling public. Salt does, however, have an adverse effect on nearby environments and groundwater sources. By increasing the ratio of liquids to solids, MnDOT will reduce the total amount

of salt applied to roadways. When placed at recommended rates, one gallon of liquid salt brine uses approximately 30% less rock salt compared to using rock salt alone. To reach department goals, MnDOT will need to increase investment in blending, storage, and application systems.

Since the winter of 2016-17, MnDOT has seen a steady increase in the rate of liquids to solids, experiencing 78% growth since the 2018-19 winter. This rate should continue to increase as investments are added and refined practices are implemented. Winters vary significantly in severity, so we do not expect to see a steady linear decline in salt use. Severe winters will require us to use more salt, even if our salt use is more effective.

Salt Use

Salt use declined during the 2020-2021 season to 159,103 tons because of weather, fewer events, better understanding by operators of internal agency salt use targets, and improved performance of liquids versus rock salt.

Figure 11: Total Salt Use

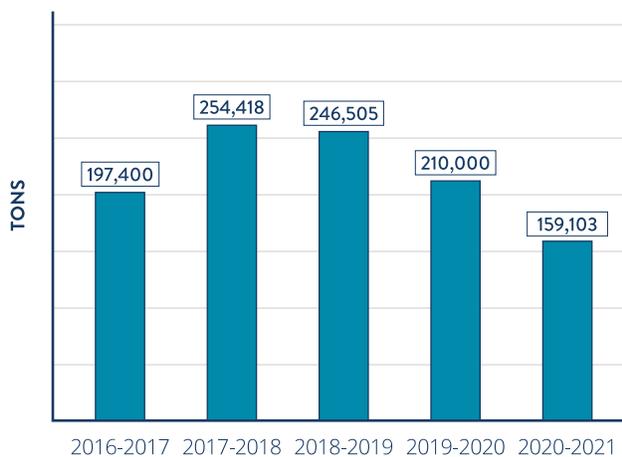
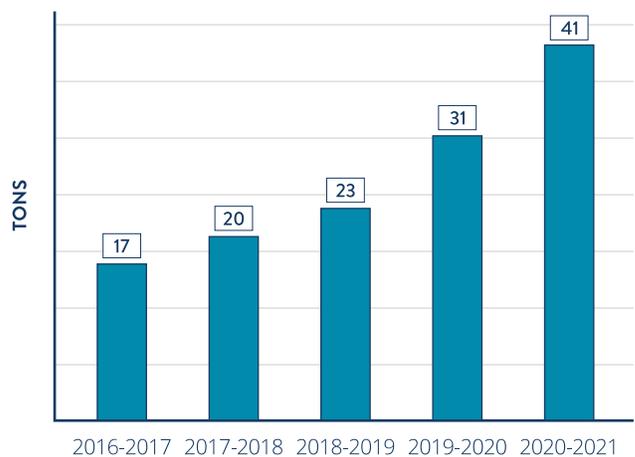


Figure 12: Liquid Gallons per Ton of Salt



Snow Fences

Long-term snow fence activity (i.e., living and structural snow fencing) increased by 8.5 miles statewide from the previous year. MnDOT's standing corn row program grew by nearly three miles from the previous year largely because of repeat farmers participating in the program and the corn soybean crop rotation working in our favor. MnDOT Districts are increasing the use of MnDOT's Blowing Snow Control Shared Service for plan development and construction inspection assistance.

Figure 13: Snow Fences

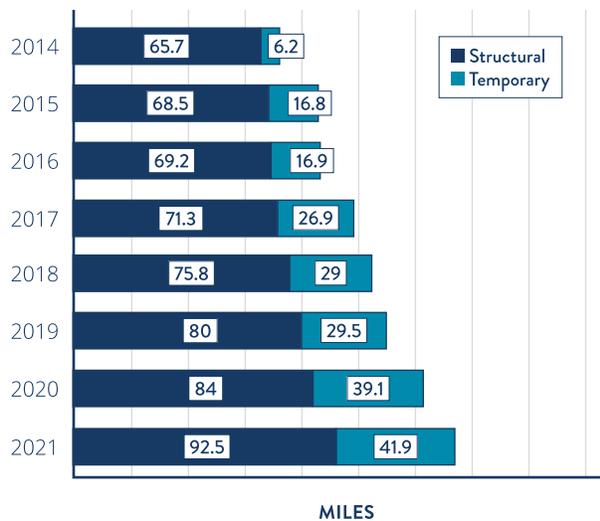
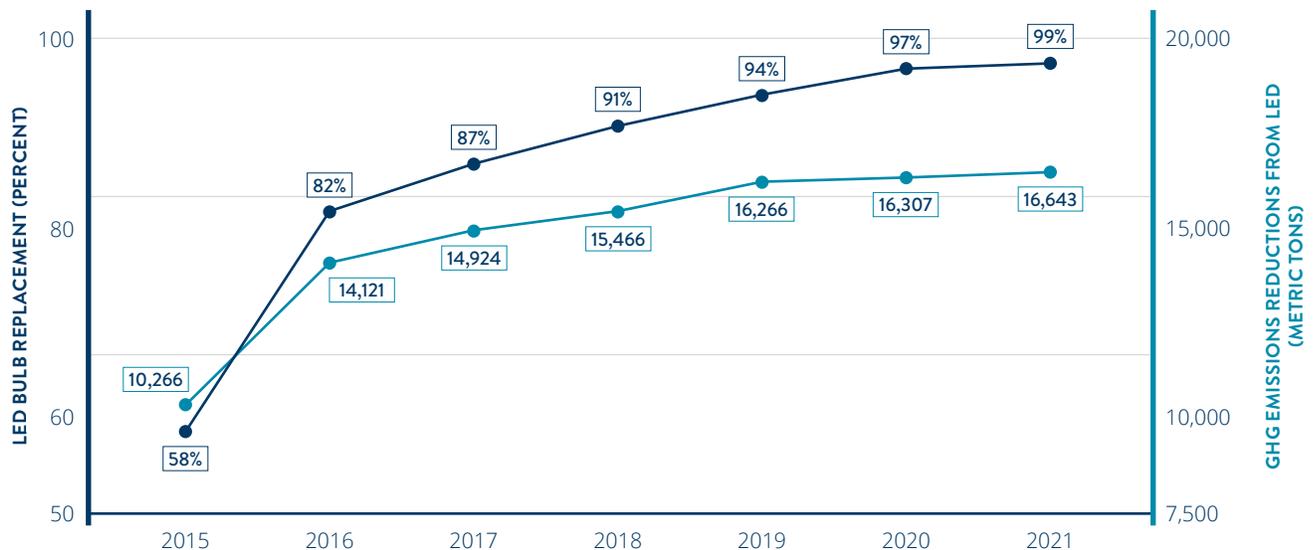


Figure 14: LED Bulb Replacement vs. GHG Emissions Reductions



LED Bulb Replacement

TARGET: Convert all lighting on MnDOT roadways to LEDs by 2020

RESULTS: In 2021, 99% of LED conversions on MnDOT roadways were complete.

MnDOT is very close to converting all lighting on MnDOT roadways to LEDs. Conversions are complete in the Metro District and several districts in Greater Minnesota. Lighting that has not yet been converted tends to be in more remote locations and the agency plans to complete these conversions soon.

While the data does not include lighting at all rest areas and tunnels, MnDOT is working to convert lighting in these areas. Two tunnels in Duluth are currently programmed for LED conversion in 2023. The estimated greenhouse gas reduction for each light converted from high pressure sodium to LED is 1,433 lbs CO₂e or 65%.

2022 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, 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 and 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			

Roadside Vegetation



METRICS

- Native seeding
- Native planting

Overview

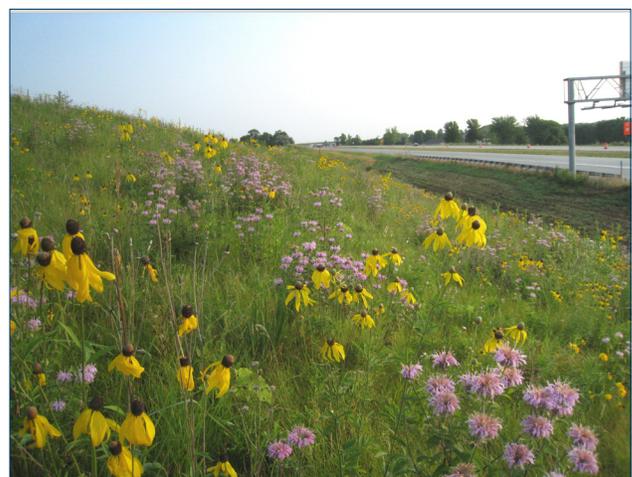
Roadside vegetation serves many functions that are critical to operating a transportation system. When native vegetation is used, roadsides can provide additional benefits such as improved aesthetics, wildlife habitat, carbon sequestration, and biodiversity preservation.

There is institutional and public support for native vegetation on 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 pressure to use native vegetation under the Endangered Species Act.

Planting recommendations are provided by the Office of Environmental Stewardship, either through general guidance or project-specific recommendations. Construction staff are responsible for implementing those designs, but sometimes make adjustments in the field that may not meet intended habitat design outcomes. Long-term viability of roadside vegetation ultimately lies with maintenance staff in each district.

2021 Accomplishments

- Made progress toward formulating roadside vegetation vision and goals.
- Shared information about the benefits of native vegetation with statewide groups within MnDOT.
- Developed designs emphasizing native plants and seeding (e.g., landscape construction and partnership, bioengineering, negotiated maintenance, living snow fence, visual management).
- Worked on updates to MnDOT’s Facility Design Guide to reflect sustainability objectives for roadside vegetation.
- Drafted specialized roadside vegetation management plans for three locations and performed a test run on one of them.
- Explored methods of tracking planting, seeding, and establishment of vegetation, such as mapping plans and mapping with Collector app.



💡 DISTRICT IN THE SPOTLIGHT:

District 6 Develops Specialized Maintenance Plan to Protect Endangered Orchid



MnDOT District 6 maintenance staff collaborated with staff from MnDOT's Office of Environmental Services to develop a specialized maintenance plan to preserve habitat for a federally threatened and state endangered orchid species. A citizen group identified the western prairie fringed orchid growing just off the shoulder on Highway 56 and asked MnDOT to consider adjusting roadside maintenance practices to protect the orchids.

The team developing the specialized maintenance plan considered input from the public and the Minnesota Department of Natural Resources, as well as the capabilities of maintenance staff and equipment.

The plan provides accommodations to protect orchid habitat in six areas with significant biodiversity.

ACCOMMODATIONS INCLUDE:

- Not using certain chemicals.
- Delaying mowing.
- Not letting haying permits.
- Doing maintenance by hand instead of using equipment.

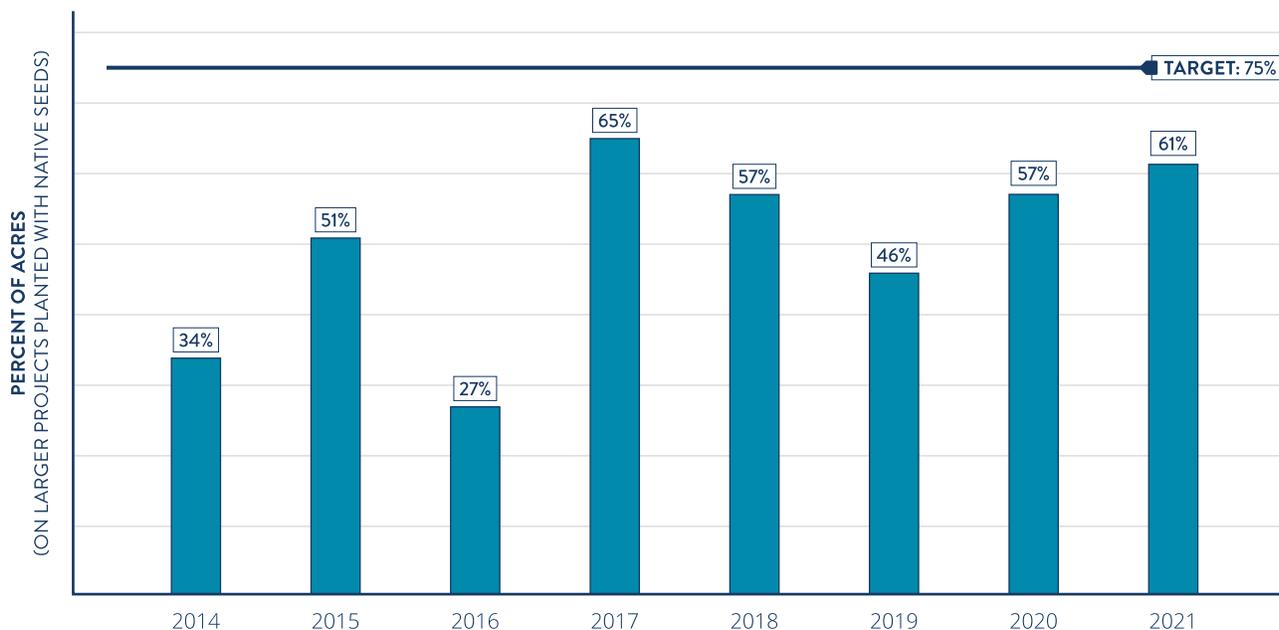
The draft specialized maintenance plan has received positive feedback from the public and kudos for taking steps to preserve orchid habitat. In addition to this orchid, there are several other state-protected plants that MnDOT considers when making maintenance decisions. Specialized management plans are a new initiative for MnDOT that provide an opportunity for collaboration between MnDOT, other agencies, and the public to conserve biodiversity.



© Western prairie fringed orchid. Photo: Dave Hanson

Measuring Progress

Figure 15: Native Seeding



Native Seeding

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

✅ **RESULTS:** In 2020, 61% of acres on large MnDOT projects were planted with native seeds.

To meet this target, environmental staff work with design, construction, and maintenance project managers to develop plans and procedures that support increased native vegetation.

MnDOT regularly provides manuals and recommendations to help project managers select the right native seed mix for their project. Native seeding on projects declined between 2017 and 2019, but the 2020 and 2021 data show a promising reversal of that trend.

The percentage of acres planted with native seeds has historically fluctuated year to year. This target isn't 100% because non-invasive, non-native species and cultivars are also used where they are needed to withstand site-specific functions.

Native Planting

🎯 **TARGET:** 80% of plants on urban projects each year and 90% of plants on rural projects each year are native plant material

✅ **RESULTS:** In 2021, 50% of plants on 16 projects evaluated were native plant material.

In 2021, the Sustainable Transportation Steering Committee set a new target that 80% of plants on urban projects and 90% of plants on rural projects are native species. This target isn't 100% because non-invasive, non-native species and cultivars are also used where they are needed to withstand site-specific functions.

Since then:

- MnDOT developed a new process to collect specified plant data, calculate existing rates of native plant material, and track future progress toward this target. During 2020 and 2021, 29 landscape construction, landscape partnership, and negotiated maintenance projects specified a cumulative rate of 51% native species plants and 49% non-native species plants (e.g., trees, shrubs, and perennials). These 29 projects do not include Design-Build and other consultant-designed landscape projects, nor living snow fence or Site Development projects. In the future, these types of projects may be included.
- To expand native plant choices, MnDOT reviewed and improved our Plant Selector

online application plant origin data which is used to select native plants by Minnesota origin.

- MnDOT is also developing methodology to convert CADD landscape plans into GIS asset management tools so that investments in native habitat can be efficiently managed and expanded upon to better sustain native pollinators in accordance with State and Federal Highway Administration direction.
- MnDOT Facility Design Guidance includes new content that emphasizes specific State and Federal policy, executive order, and technical guidance to further prioritize designing landscape projects to achieve native planting sustainability goals.

2022 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.

ACTION	STATUS	COMPLETE BY	POTENTIAL TO...		
			Reduce GHG emissions	Improve public health	Support climate resilience
1 Update design and construction standards by re-writing seeding manual	 IN PROGRESS	Ongoing			
2 Revise seed mixes to improve establishment speed of native mixes and increase native components of non-native mixes	 IN PROGRESS	Ongoing			
3 Create four fact sheets on seed mix expectations and establishment needs	 IN PROGRESS	Ongoing			
4 Formulate roadside vegetation vision and goals	 IN PROGRESS	Ongoing			
5 Share information about the benefits of native vegetation with three statewide groups within MnDOT	 IN PROGRESS	Ongoing			

2022 Planned Actions Table, continued

ACTION	STATUS	COMPLETE BY	POTENTIAL TO...			
			Reduce GHG emissions	Improve public health	Support climate resilience	
6	Develop designs emphasizing native plants and seeding (e.g., landscape construction and partnership, bio-engineering, negotiated maintenance, living snow fence, visual quality)	 IN PROGRESS (75% COMPLETE)	Ongoing			
7	Update Facility Design Guide to reflect sustainability objectives for roadside vegetation	 IN PROGRESS (75% COMPLETE)	Ongoing			
8	Implement specialized roadside vegetation management plans for three locations	 IN PROGRESS	Ongoing			
9	Explore methods of tracking planting, seeding, and establishment of vegetation; such as mapping plans and mapping with the Collector app	 IN PROGRESS (30% COMPLETE)	Ongoing			
New 10	Investigate MnDOT's process of evaluating topsoil on construction projects from materials recommendations through the design phase to construction	 NOT STARTED	2023			
New 11	Develop a new provision that would create an alternate process for specifying and paying for vegetation establishment on projects to be tested on a construction project in 2023	 IN PROGRESS	2023			

Construction



METRICS

- Greenhouse gas emissions from MnDOT construction projects
- Sustainable pavements

Overview

MnDOT is responsible for 11,695 centerline miles of state highways, 620 miles of sidewalk along state highways, and 1,132 miles of national and state designated bicycle routes in Minnesota. Construction activities focus on keeping the system in usable condition. Preserving existing roads typically has lower costs than new construction, replacement, or reconstruction because it requires less material acquisition, transportation, and processing.

There are situations where replacement or reconstruction can have the lowest environmental impact when the focus is on long-term performance. Assets that are built well and require limited preservation can provide the lowest overall emissions during their service life.

There are several cost-competitive pavement construction techniques with the potential to reduce lifecycle greenhouse gas emissions and extend pavement life. MnDOT continues to become more familiar with these practices and increase our use of these techniques.

Other strategies include expanding work or practices that MnDOT is already doing, including:

- Properly-timed preservation activities.
- Long-term fixes.
- Implementing advances in recycled materials.

2021 Accomplishments

- Sustainable pavement case studies were published on MnDOT intranet and external website. Staff drafted communications plan for promoting existing case studies and potentially developing additional case studies.
- Began work on Life Cycle Assessments to incorporate into Environmental Product Declarations.
- Continued to participate in Federal Highway Administration Sustainable Pavement Peer Exchange.
- Shifting from type 1 cement to type 1L (Portland-Limestone) cement, which reduces greenhouse gas emissions from cement production by as much as 10% to 12%.
- Conducted research projects at MnROAD to test pavement and construction technologies that can increase longevity of projects and provide other sustainability benefits, including spray rejuvenators to extend the life of Cold In-Place Recycling pavements, titanium dioxide “smog-eating” treatments, materials to reduce dependence on concrete, and plastics and rubber in the asphalt mix to prevent cracking.



📷 Cold in-place recycling emulsion pavement

💡 DISTRICT IN THE SPOTLIGHT:

Districts 1 and 2 Use Geotextile Fabric to stabilize and reinforce roadbed



District staff have partnered with materials engineers at MnDOT to develop innovative solutions to challenging environmental conditions, such as roads in flood-prone areas with poor soil. Geotextile fabric with moisture-wicking properties helps move the water out to the edge of the roadbed, strengthens the soil, and reduces degradation of the concrete or bituminous above it.

This fabric can be used instead of other stabilizing materials and reduces the need for excavation and hauling excavated materials and sand, which typically need to be hauled a long distance. This can reduce fuel consumption during construction. An upcoming project in District 2 includes plans to include geotextile fabric to stabilize poor soils in a flood-prone area.

Using geotextile fabric to stabilize the soil in a full-depth reclamation instead of the traditional use of oil also provides a cost savings of up to 83%. On Highway 200 in District 2 near Walker, geotextile fabric was used in place of oil in a stabilized full-depth reclamation project, leading to a 4.5% savings of bitumen and 3% oil savings.

Geotextile fabric has been used on several recent construction projects, including Highway 38 north of Grand Rapids in District 1, where project staff used geotextile fabric instead of grading to preserve the scenic nature of the location.



📷 TenCate Geosynthetics

Measuring Progress

Greenhouse Gas Emissions from MnDOT Construction Projects

🎯 **TARGET:** 30% reduction from 2018 levels by 2025

📊 **RESULTS:** Between 2018 and 2019, greenhouse gas emissions from MnDOT construction projects decreased by 23%. 2020 and 2021 data are not yet available.

The total estimated greenhouse gas emissions from construction projects let in 2019 is 154,098 metric tons of CO₂e. This is a 23% decrease from the total from the 2018 inventory and is much closer to MnDOT's target of 140,000 Mt CO₂e by 2025. Most of the difference is due to fewer and smaller bridge reconstruction projects, and fewer miles of roadway projects. The inventory is a best guess based on the information available and the assumptions built into the calculator.

Figure 16: Construction GHGs



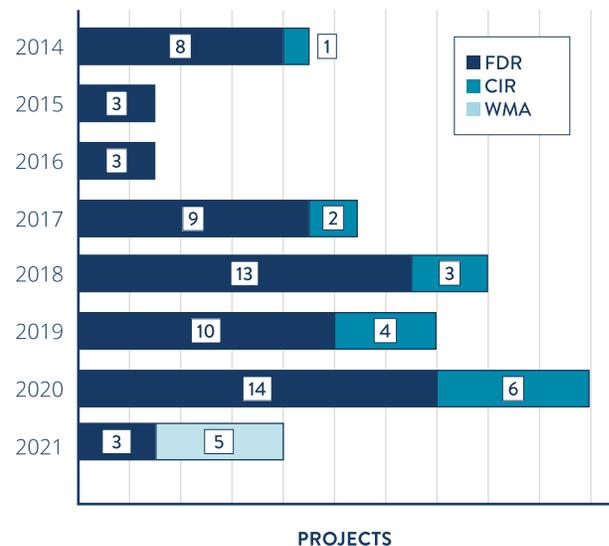
While there are mitigation techniques in limited use, most of the reduction is driven by the relative intensity of the yearly construction plan. For example, the 2018 to 2019 difference in emissions from roadway projects (e.g., pavement rehabilitation, new construction, widening or adding lanes, etc.) was 14,123 Mt CO₂e.

Sustainable Pavements

Full-depth reclamation and cold in-place recycling can lower construction greenhouse gas emissions by reducing the amount of material that needs to be extracted and produced, as well as transported on site. Additionally, stabilized full-depth reclamation produces a stronger roadway base and requires less new asphalt. All three techniques extend pavement life, further reducing lifecycle greenhouse gas emissions.

MnDOT used sustainable pavement practices on eight projects in 2021, which decreased from 20 in 2020. In addition to the three full-depth reclamation projects, there were five projects that used warm-mix asphalt, which is defined as any mix that is produced at a temperatures 30 degrees Fahrenheit or lower than typical hot-mix asphalt mixing temperature. With increased experience using these techniques, districts can implement them more often. However, they are situationally dependent, limiting the scope of their implementation.

Figure 17: Sustainable Pavement



2022 Planned Actions Table

The following actions are planned for 2022 to increase understanding of sustainable pavement opportunities. Applying learnings from the case studies, environmental product

declaration information, and peer exchanges will reduce greenhouse gas 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			
New 3 Conduct research project to increase understanding and use of Environmental Product Declarations across the industry	 IN PROGRESS	2023			
New 4 Track results of sustainable material test cell projects at MnROAD	 IN PROGRESS	Ongoing			
New 5 Track use of type 1L cement to replace type 1 cement for next year's report	 IN PROGRESS	Ongoing			
New 6 Work with concrete suppliers that reuse water	 IN PROGRESS	Ongoing			
New 7 Explore workshop or training on sustainable materials for project managers	 IN PROGRESS	2023			

The Road Ahead

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

There are many opportunities ahead to accelerate our state's progress. Since 2016, MnDOT has worked collaboratively to identify meaningful actions, quantify results, and openly communicate progress and headwinds. This report is the latest snapshot of the important steps we're taking on our journey to meet MnDOT agency 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 2022 include the following:

- Develop facility energy plans for two additional MnDOT Districts that identify energy efficiency and renewable energy projects.
- Lead efforts to electrify the MnDOT fleet, install EV chargers at MnDOT facilities, and pilot higher-level biofuel blends.
- Use innovative salt sustainability solutions including anti-icing, pre-wetting and slurries; icebreakers and underbody plows; and alternative chemicals to reduce total salt use.
- Take steps toward increasing native species in roadside vegetation mixes, including formulating roadside vegetation vision and goals and establishing methods of tracking planting, seeding, and establishment of vegetation.
- Conduct research project to increase understanding and use of Environmental Product Declarations in the construction industry.

We'll continue to communicate about efforts through this annual report 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 meet the challenge.