Minnesota Department of Transportation

SUSTAINABILITY REPORT 2018

MAY 2019

DEPARTMENT OF TRANSPORTATION

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May 2019

2018 saw the release of two seminal reports on our changing climate. The International Panel on Climate Change report released by the United Nations and the National Climate Assessment shared similar scientific findings that climate change will present growing challenges to human health and safety, quality of life, and the rate of economic growth in the US and around the world. Further, in the Midwest, at-risk communities are becoming more vulnerable to climate change impacts, especially tribal nations because of their reliance on threatened natural resources.

In Minnesota, climate change is already having major impacts and these impacts are projected to increase in the future. More varied temperatures, precipitation levels, and the frequency of extreme weather events will further stress our transportation system, impact the way Minnesotans travel, and increase the cost of building, operating and maintaining transportation infrastructure.

MnDOT has a statutory goal to reduce greenhouse gas emissions from the transportation sector. Reducing impacts to the environment and climate are not only the right thing to do, but these efforts can save taxpayers money. MnDOT is committed to leading by example in reducing emissions from our own agency operations and partnering with the public, private, and nonprofit sectors to reduce emissions from the transportation sector as a whole.

The 2018 MnDOT Sustainability Report: Planning for Progress reflects agency leadership and progress in a number of areas and also highlights areas where more work is needed. Some specific achievements from 2018 include:

- MnDOT has converted 92% of lighting on highways to higher efficiency LEDs and we are on track to meet the goal of converting 100% of highway lighting by 2020. This will save money and reduce emissions (16,811 metric tons of CO2e).
- MnDOT has increased the use of native seeds to 57% of highway acres on large MnDOT projects.
- MnDOT constructed 16 pavement projects using cold-in-place recycling or full-depth reclamation construction techniques that result in longer lasting pavement with lower costs and fewer emissions.

The MnDOT vision is that "Minnesota's multimodal transportation system maximizes the health of people, the environment and our economy." This report highlights some of the agency efforts that help that vision become a reality. Please visit our agency website to learn more about MnDOT efforts to promote sustainability and public health: http://www.dot.state.mn.us/sustainability/

Sincerely,

Margaret Anderson Kelliher

Margaret Anderson Kelliher
Commissioner

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The cover image shows 607 LED light fixtures on I-35W in Minneapolis, MN. MnDOT is on track to convert all highway lights to LEDs by 2020. *Photo credit: David Gonzales*

Introduction

The 2018 Sustainability Report is the third annual report from the Minnesota Department of Transportation (MnDOT). Similar to previous reports, the 2018 report largely focuses inward on agency operations and how we manage assets like our vehicles, buildings, and roadsides. The performance measures reflect a combination of voluntary agency targets, direction from executive orders, legislative requirements, and agency priorities.

The reports will continue to evolve over time, as described below:

- *2016: Establishing a Baseline* created baselines for sustainability data and set targets for future performance
- *2017: Identifying Sustainability Strategies* has improved data and identifies potential strategies to make progress toward performance targets
- *2018: Planning for Progress* includes the first action plan for achieving the 2025 fuel reduction targets for the MnDOT vehicle fleet. This will be the model for future action plans for all remaining performance measures.

Starting in 2019, the MnDOT Sustainability Report will include more information about efforts to reduce emissions from the transportation system, which is the number one source of greenhouse gas emissions globally, nationally, and in Minnesota.

Sustainability at MnDOT

MnDOT established the Sustainable Transportation Steering Committee (STSC) 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 (GHG) mitigation and climate adaptation. The STSC is championed by the Deputy Commissioner/Chief Engineer and includes senior leaders from across the agency. The Office of Sustainability and Public Health staffs the STSC and coordinates with agency technical experts who advise, implement, track, and report on the performance measures identified in the annual sustainability reports.

The STSC and agency leadership have identified four main sustainability focus areas based on a combination of internal priorities, executive directives, and legislative requirements.

1. Minimize the impact of our operations on the climate and our environment.
2. Reduce greenhouse gas emissions from the transportation sector.
3. Improve the resilience of our transportation system.
4. Promote public health and healthy communities.

Greenhouse Gas Emissions Reduction

In 2016, MnDOT voluntarily set ambitious greenhouse gas emissions reduction targets. The targets and 2018 results are summarized in Table 1.

Table 1. MnDOT Greenhouse Gas Emissions Reduction Targets

Metric	Target	Results
Sector Level Total annual GHG emissions generated by Minnesota's transportation system	29,500,000 tons CO_2e	41,842,898 tons CO_2e 2018
State Highway Construction Total annual GHG emissions from the fuel and materials used to construct MnDOT projects	252,500 metric tons CO_2e	228,245 metric tons CO_2e 2017
MnDOT GHG Emissions - Facilities Total annual GHG emissions generated from energy used by MnDOT-owned facilities	21,800 metric tons CO_2e	27,012 metric tons CO_2e 2018
Fleet Total annual GHG emissions generated from fuel used by the MnDOT-owned fleet	26,500 metric tons CO_2e	43,028 metric tons CO_2e 2018

Related Statutes and Executive Orders

Executive Order 19-25: Advancing Energy Efficiency and Renewable Energy Programs for Minnesota's Public Buildings

Executive Order 19-27: Directing State Government to Conserve Energy and Water, and Reduce Waste to Save Money

Executive Order 19-28: Restoring Healthy, Diverse Pollinator Populations that Sustain and Enhance Minnesota's Environment, Economy, and Way of Life

MN Statute 174.01 Subd. 2. Includes the following:

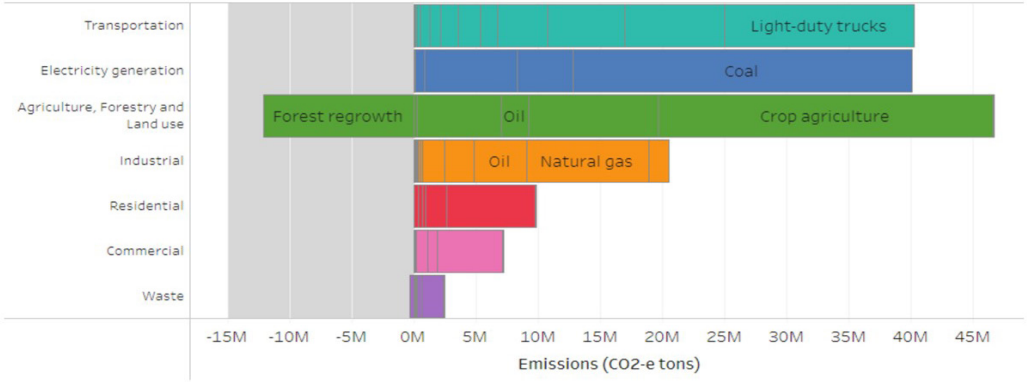
- 10) to ensure that the planning and implementation of all modes of transportation are consistent with the environmental and energy goals of the state;
- 11) to promote and increase the use of high-occupancy vehicles and low-emission vehicles;
- 15) to reduce greenhouse gas emissions from the state's transportation sector

Transportation is Driving Climate Change

The most recent greenhouse gas (GHG) emissions inventory from the Minnesota Pollution Control Agency (MPCA) showed that transportation overtook the electricity generation sector to become the number one source of GHG emissions in Minnesota starting in 2016 (Figure 1). This is consistent with trends in other states, and changes in both sectors and trends (electricity decreasing, transportation increasing) are expected to continue from 2016 to now.

- Emissions from electricity generation have decreased almost 30% between 2005 and 2016, largely due to reduced use of coal and increased use of renewable energy and natural gas, which are more cost effective and have lower carbon emissions.
- Transportation emissions decreased 8% from 2005 to 2016, with reductions credited to federal fuel efficiency standards. However, the trend towards larger trucks and SUVs and more miles traveled prevented more significant reductions.

Figure 1. 2016 sector sources of GHG emissions and storage, Minnesota (MPCA)



Minnesota's Climate is Changing

Climate change is already causing major impacts in Minnesota and these impacts are expected to increase in the future. More varied temperatures, precipitation levels, and the frequency of extreme weather events will stress the transportation system and increase the cost of building, operating, and maintaining transportation infrastructure and impact the way that Minnesotans travel.

The United Nation's Intergovernmental Panel on Climate Change report , released in October 2018, found that if GHG emissions continue at the current rate, the atmosphere will warm by up to 2.7° Fahrenheit (1.5° Celsius) above preindustrial levels by 2040, inundating coastlines, intensifying droughts and poverty, and increase global insecurity. The report concluded that if we keep burning fossil fuels like we have been, temperatures could rise by more than 3° Fahrenheit and that could be catastrophic in many parts of the world.[1]

According to the Federal Government's National Climate Assessment released in November 2018, at-risk communities in the Midwest are becoming more vulnerable to climate change impacts. Tribal nations are especially vulnerable because of their reliance on threatened natural resources. In cities, climate change means more flooding and problems with infrastructure. And in the rural areas of the Minnesota, it could hurt farmers as heavy rain erodes soil needed to grow crops, making it tougher to do field work (e.g., fields have been too wet at harvest time to get in with tractors). [2]

Sustainability Activities in 2018

Temperature Set Points; Small adjustments to minimum and maximum temperatures, in alignment with standards in other states, are expected to save MnDOT over $200,000 per year and reduce overall building energy use by up to 10%.

Idle Reduction Standards; MnDOT staff may need to idle for long periods of time in extreme heat or cold or when operating certain equipment. However, new standards prohibit "unnecessary" idling, which is expected to save the agency over $100,000 per year and reduce total agency fuel use by up to 14%.

Solar Energy; MnDOT developed guiding principles around solar energy that framed our approach to solar energy projects that outline our support for projects are cost-neutral or save money, promote agency equity and diversity goals, and/or support the agency vision and mission. MnDOT pursued three solar projects in 2018 with mixed success:

1. Ramp A – MnDOT finalized an agreement for a Community Solar Garden (CSG) on a parking ramp in downtown Minneapolis with a developer committed to workforce targets for underrepresented populations and to marketing subscriptions to lower income residential energy customers. The elevated solar panels will function like a carport above the parked cars. MnDOT will lease the space on the top deck of Ramp A and be a backup subscriber for 20% - 40% of the total subscriptions.

2. Solar Possible - MnDOT submitted three sites in a joint RFP for collaborative solar procurement with state and local agencies led by the Department of Administration. MnDOT did not move forward with the projects because of costs and/or specific challenges associated with each location.

3. Fort Snelling/Central Shop – MnDOT issued a request for proposals to install solar on the roof of the interior vehicle storage portion of our Central Shop. MnDOT did not move forward because the way the building was constructed created additional costs with installing solar.

Fuel Efficiency Standards; MnDOT and the MPCA joined a number of states across the country in preparing comments opposing the federal government proposal to weaken fuel economy standards for light duty vehicles and make it harder to achieve the transportation GHG emissions reductions.

Sustainability and Public Health; In late 2018, MnDOT established a Chief Sustainability Officer and two Sustainability Coordinator positions in the Office of Sustainability and Public Health to work with key partners and stakeholders to champion long-term, cost-effective investments in improved energy efficiency, renewable energy, transportation electrification, and resource conservation.

Accelerating Electric Vehicle Adoption: A Vision for Minnesota; MnDOT, MPCA, and the nonprofit Great Plains Institute on a vision and strategies for encouraging greater adoption of electric vehicles and charging equipment across the state and sets a goal for having 200,000 electric vehicles in Minnesota by 2030.

Statewide Extreme Flood Vulnerability Analysis; MnDOT is working with a consultant to develop a process for evaluating flood risk to MnDOT bridges, large culverts, and pipes. Studying the performance of infrastructure under predicted extreme events will help MnDOT assess the impacts of climate changes to plan, design, build, and maintain assets for resilience. This project is estimated to be complete in 2020.

Examples of Planned and Ongoing Sustainability Work in 2019

Pathways to Decarbonizing Transportation; MnDOT is a leading multi-agency effort to model different options, or "pathways," for achieving the state's Next Generation Energy Act greenhouse gas emission reduction targets for the surface transportation sector (cars, trucks, and buses) and working with technical stakeholders and the general public to get feedback on policy options. A report is expected around August 1, 2019.

Community Solar Gardens (CSG); MnDOT issued an RFP to purchase CSG subscriptions to increase our use of renewable energy to power agency buildings, while providing guaranteed cost savings. MnDOT plans to finalize agreements by early summer 2019.

Climate Resilience; MnDOT will be compiling work around climate resilience done here and by other agencies to develop a strategic plan for incorporating resilience into agency decision-making. The goal is to have a draft plan ready for comment by December 2019.

Facilities

Background

MnDOT owns and operates over 1,075 buildings with over 6,600,000 square feet, including:

- 137 truck stations
- 18 District headquarters and maintenance sites
- 5 special services sites: MnROAD Research Facility, Arden Hills Training Center, Central Shop, Maplewood Materials Lab, and the Aeronautics building
- 173 salt/sand delivery sites
- 68 rest area buildings

Strategy in the Spotlight: Temperature Set Points

In April 2018, MnDOT established temperature set point standards. The federal government and many state and local governments have building operating standards that dictate space temperatures and occupied hours of heating, ventilation, and air conditioning (HVAC) equipment.

The temperature set point standards were developed to provide MnDOT facilities managers with the maximum and minimum temperature for office spaces/labs, mechanics/welding shops, and warm storage, along with a schedule of occupied hours for HVAC equipment.

Fully implementing the temperature set point standards will reduce overall MnDOT building energy consumption by 6% to 10% and save up to $200,000 per year, which can be used to fund other agency needs.

Strategies and Tactics

Reduce Building Energy Use

- Continue efficiency efforts such as building automation, equipment upgrades, and lighting upgrades
- Use standardized specifications for new construction that exceed energy code requirements. All State bond-funded new construction must meet SB2030 requirements.
- Provide feedback on building energy performance to facilities managers to encourage energy saving activities
- Promote renewable energy by researching solar costs at new truck stations and soliciting bids for community solar garden subscriptions

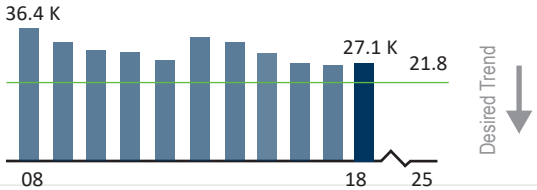
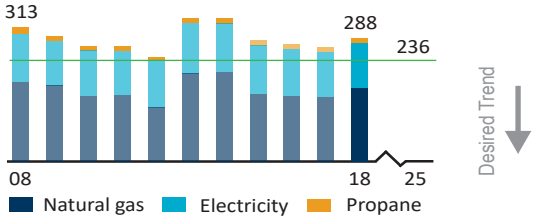
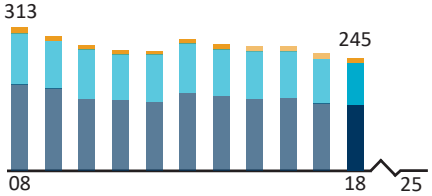
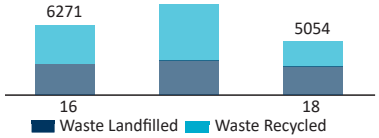
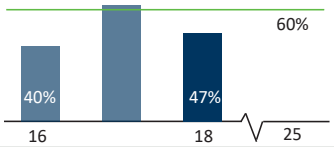
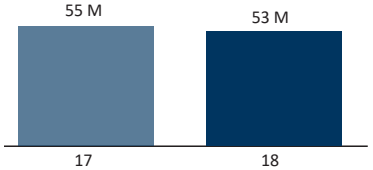
Reduce Waste

- Identify recycling captains to promote recycling and support compliance in MnDOT Districts
- Develop and release a plan for implementing best practices, such as signage posted, new employee training, training at annual waste coordinator workshops, and periodic waste audits
- Review options for providing organics recycling in designated areas of the state
- Identify a method for tracking paper use and develop a communications plan for reducing paper use

Reduce and Conserve Water Use

- Install additional water meters to allow MnDOT to track and manage use
- Minimize landscape irrigation
- Seal artesian flowing wells
- Re-use stormwater and waste water
- Incorporate additional water conservation measures into new building construction and existing building renovation

Facilities

Metric	Target	Results	Trend	Analysis
Greenhouse Gas Emissions Annual total carbon dioxide equivalent emissions generated by MnDOT-owned facilities	21,880 metric tons CO_2e -30% from 2005 to 2025	27,126 metric tons CO_2e		Emissions from energy used by MnDOT facilities decreased 25% between 2008 and 2018, due largely to cleaner energy on the electric grid. However, emissions increased 3.5% from 2017 to 2018 as the agency expanded facilities and used more natural gas for heating. **Progress Needed: -23.4%**
Total Energy Use Annual total electricity, natural gas, and propane consumption at MnDOT-owned facilities	236 BBTU -20% from 2008 to 2025[3]	288[4] BBTU		While total energy use increased slightly, weather-normalized energy use decreased 3% between 2017 and 2018. Upgraded mechanical equipment and lighting contributed to the overall decline. **Progress Needed: -22%**
Actual Weather Normalized Energy Use Annual total electricity, natural gas, and propane consumption at MnDOT-owned facilities normalized to a 2008 baseline	No target			
Renewable Energy Amount of renewable energy as percent of total energy used by MnDOT*	25% Total energy by 2025[7]	0.3%	Capacity Solar = 40 kW Wind=35 kW Geothermal=80,000 kBTU	The 35 kW wind turbine used to power MnDOT's Slayton truck station will be decommissioned in 2019 due to mechanical issues. **Progress Needed: +25 percentage points**
Waste Generated Annual total waste generated by MnDOT-owned facilities	To be set in 2019	5,054 metric tons**		MnDOT reported 40% less waste in 2018 from 2017, largely because 2017 data included 3,000 tons of signage recycled by Metro District and data collection improved. Compared to the more typical 2016 baseline year, total waste is down 19%.
Waste Recycled Annual total waste diverted through recycling by MnDOT-owned facilities[5]	60% until 2030 then 75% for Metro[6]	47%[7] of total waste generated**		Waste recycled declined by 15 percentage points in 2018 compared to 2017. The higher-than-average volume of signage recycled in 2017 contributed to this trend. **Progress Needed: + 13 percentage points**
Water Consumption Total water consumed at MnDOT-owned sites annually	TBD -15% from 2017 by 2025	53[4] million gallons***		MnDOT's reported water use declined 4% between 2017 and 2018. Not enough data is available to determine if this decrease is a downward trend or a natural variation in our water use pattern. In 2018, MnDOT assessed approximately 125 sites' facility water use through an audit tool similar to the EPA WaterSense assessment.

*Includes MnDOT 35 kW wind turbine at D8 Slayton Truck Station and 40 kW solar array at D6 headquarters in Rochester. Geothermal energy indirectly helps MnDOT with on-site renewable energy goals by reducing the total energy we consume.

** Recycling includes all specialty recycling such as scrap metal, batteries, and auto oil. This measure tracks waste at MnDOT's headquarters and truck stations, but does not include Rest Areas.

*** In previous version of the MnDOT Sustainability report, water consumption was reported based on estimates that used typical buildings and assumed values. The current data is based on meter readings and not all buildings are metered. MnDOT uses water differently than typical so the assumptions made in the original estimate do not reflect MnDOT practices. It is likely that MnDOT uses more water than is shown in this report. Any location that MnDOT obtains water from other than metered buildings will not be reported here (i.e. from hydrants or other facilities). It is also possible that there are incorrect units still present in the data and that we are underreporting. The agency has ongoing efforts to improve data collection. MnDOT is still working to develop baseline data.

Fleet

Background

MnDOT uses a variety of vehicles and fuels to perform maintenance, deliver snow and ice services, and perform various employee duties across the state. MnDOT fleet procurement decisions are made by the MnDOT Office of Maintenance in coordination with the MnDOT Offices and Districts that operate the vehicles.

MnDOT owns more than 4,000 vehicles, including:

- 1,200 light-duty vehicles
- 2,700 heavy-duty vehicles
- 35 hybrid vehicles
- 3 plug-in hybrid-electric vehicles
- 1 battery-electric vehicle

Strategy in the Spotlight: Electric Vehicles

The 2016 MnDOT Sustainability Report set the goal of reducing GHG emissions from Minnesota's transportation sector by 30% from 2005 levels by 2025. Light-duty vehicles generate the majority of transportation GHGs in the state. While federal fuel economy standards will lower emissions in the future, electrifying light duty vehicles is an important strategy to meet the goal.

In 2018, MnDOT partnered with the MPCA and Great Plains Institute to develop the Accelerating Electric Vehicle Adoption: A Vision for Minnesota. It is the first coordinated attempt to outline a statewide vision for increasing EV use. The Vision describes strategies for achieving the goal of powering 20% of the light-duty cars in the state with electricity by 2030.

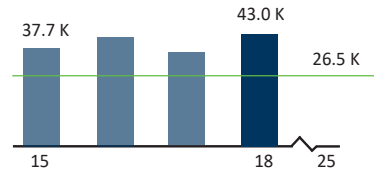
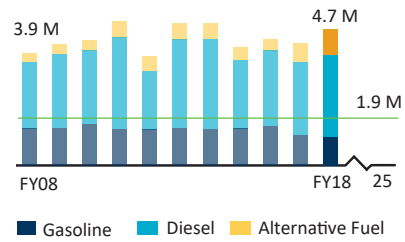
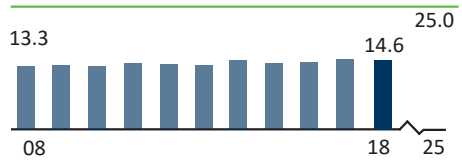
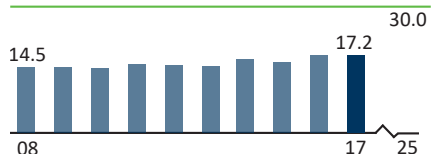
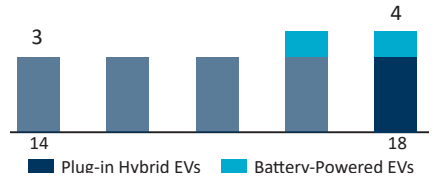
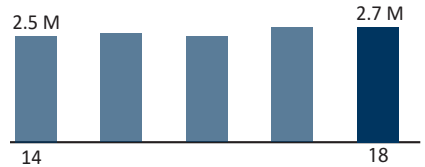
Strategies and Tactics

2019 MnDOT Fleet Fossil Fuel Reduction Action Plan

MnDOT will take the following actions in FY2020:

- Implement idle reduction standards to eliminate unnecessary idling and purchase idle reduction technology for all new trucks under 1.5 tons
- Review differences in fuel efficiency between vehicles that are the same model to inform future vehicle use guidance and purchasing decisions
- Purchase 5 battery-electric vehicles and 16 plug-in hybrids to replace vehicles scheduled for replacement in FY19
- Implement a decision-making tool to right-size the fleet and use more fuel efficient vehicles (specifically, plug-in hybrids and electric vehicles)
- Replace 14 Class 1 trucks (up to ¾ ton) scheduled with electric or plug-in hybrid vehicles

Fleet

Metric	Target	Results	Trend		Analysis
Greenhouse Gas Emissions **Annual total GHG emissions from fuel used in MnDOT vehicles**	26,500 metric tons CO_2e	43,028 metric tons CO_2e			MnDOT generated 21% more emissions in 2018 than 2017 because the agency used 20% more fuel year-over-year.
Total Fuel Use Annual total fuel use by MnDOT vehicles	1.9 million gallons 50% reduction from 2005 by 2025[8]	4.7 million gallons[9]		Desired Trend	MnDOT used 12% more fuel in FY 2018 than FY 2017. The increase was driven primarily by diesel fuel use, which increased 12% during the time period. MnDOT used more diesel to manage snow and ice in winter 17-18 compared to the previous year. **Progress Needed: -60%**
Diesel Fuel Use Annual total diesel fuel use by MnDOT vehicles	1.1 million gallons 25% reduction from 2005 by 2025	2.8 million gallons[9]			
Fleet Vehicle Fuel Efficiency Annual average miles per gallon achieved by MnDOT Class 1-4 vehicles	25 mpg 2025	14.6 mpg[9]		Desired Trend	Average vehicle efficiency has remained fairly consistent since 2008. Class 1-4 vehicle efficiency declined less than 1% between 2017 and 2018. **Progress Needed: +71%**
Light Duty Vehicles Annual average miles per gallon achieved by MnDOT Class 1 vehicles	>30 mpg	17.2 mpg[9]		Desired Trend	Since 2008, light duty vehicle efficiency has improved. Light duty fuel use stayed the same between 2017 and 2018. **Progress Needed: +74%**
Electric Vehicles Total number of plug-in hybrid electric and battery electric light duty MnDOT vehicles	22 new EVs planned for 2019	4[9]		Desired Trend	MnDOT purchased three plug-in hybrid electric vehicles in 2013. MnDOT purchased a Chevy Bolt in 2017. EVs are 2% of the sedans MnDOT owns. **Progress Need: Target to be re-evaluated in 2019**
Employee-Owned Auto Mileage Annual total number of miles traveled by MnDOT employees in personal vehicles for work purposes	TBD	2.7[10] million miles		Desired Trend	MnDOT has no previously set target for reducing employee-owned auto mileage. MnDOT encourages employees to use the right vehicle or mode for the right job, and consider Skype/video conferencing.

[*] Alternative fuel includes E-85 and B-20. In 2018, MnDOT identified a fuel product coding error that caused some gasoline fuel to be coded as E-85 fuel. This may have resulted in E-85 fuel use appearing higher than it actually was. The error will be resolved for fuel data for 2019 and beyond.

Highway Operations

Background

MnDOT owns 11,814 miles of centerline state trunk highway system and 28,500 highway lights.

The agency maintains 30,858 lane-miles throughout Minnesota. MnDOT operates a fleet of 840 plow trucks, including 47 reserve plows. 1,813 fulltime and backup snowfighters use salt and sand to manage snow and ice.

Strategy in the Spotlight: LED Lighting Conversion

The agency will transition all highway lighting to light emitting diode (LEDs) by 2020. In 2018, the transition was 92% complete. LED lighting will replace high-pressure sodium luminaires, which use 400 watts of electricity each. MnDOT expects many benefits from the conversion:

- LED lighting offers brighter, higher quality light and supports traveler safety. Each LED luminaire uses 65% less electricity saving MnDOT $200,000 per year in electricity costs.
- LEDs last longer than HPS lighting, so the agency expects additional savings because highway lights will be replaced less frequently.
- The reduced energy from operating, installing, and repairing the LED lights will have corresponding GHG reduction benefits.

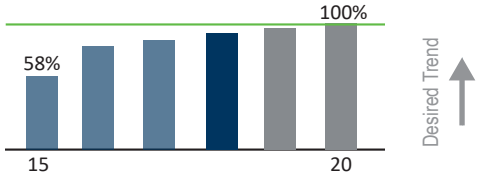
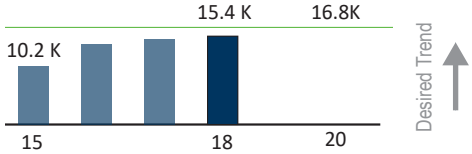
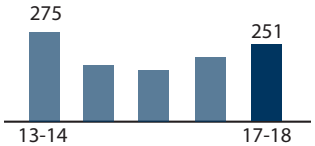
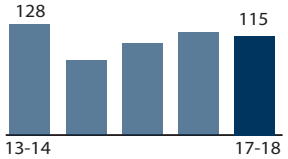
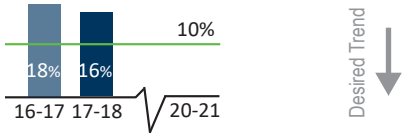
Strategies and Tactics

Salt Sustainability

MnDOT is actively pursuing the following ways to maintain safety and reduce the nagive environmental effects of chlorides:

- Use technology, like anti-icing and pre-wetting, to optimize the treatment and use of salt on roads
- Use liquid chemical deicers instead of salt or sand
- Use underbody plows to reduce the amount of salt needed
- Train drivers on new snow plowing techniques
- Pursue chemical and equipment innovations not currently used at MnDOT
- Install blowing snow control measures such as living snow fences, standing corn rows, strategically placed bales, native tall grass wildflower prairie plantings, and road design elements to increase snow storage or facilitate the wind blowing the snow off the surface

Highway Operations

Metric	Target	Results	Trends	Analysis
LED Bulb Replacement % Total count of LED lighting installed on MnDOT roadways	100% 2020	92%		Converting from high-pressure sodium (HPS) to light-emitting diodes (LEDs) saves an estimated 65% on electricity costs/use per luminaire. MnDOT is on pace to convert 100% of roadway lighting with LED by 2020, which is estimated to reduce almost 29,000 MWh per year.
GHG Emissions Reductions Total GHG emissions reduced by converting to LEDs	16,811 metric tons CO_2e 2020	15,466 metric tons CO_2e		**Progress Needed: 8% remaining**
Salt Use Annual total salt applied to MnDOT roadways	No Target	251 tons[11] Winter 17-18		MnDOT used 27% more salt in 2017-2018 compared to the previous year. Several factors influenced the amount of salt used, including wind speed, gusts and direction, and precipitation type, duration, and amount. MnDOT tracks salt use and provides reports from MDSS to improve the snow and ice control process and ensure the agency doesn't use more salt than necessary.
Winter Severity Index Statewide measure that incorporates factors affecting the severity of the winter season such as dew point/ relative humidity, wind speed, gusts and direction, frost/ black ice, precipitation type, duration and amounts, air temperature, road temperature, cloud cover, blowing snow, and surface pressure	No Target	115 Winter 17-18		The winter severity index declined from 119 to 115 between the winter of 2016-2017 and 2017-2018. Winter severity is a statewide average value. Half the Districts had a more severe winter between 16-17 and 17-18 and the other half had a similar or less severe winter between 16-17 and 17-18. The half that had the more severe winter was in the more populated areas of the state, including the Twin Cities area, where more resources are typically needed because of the higher traffic count.
Adjusted % Above MDSS Recommendation Annual total salt used by MnDOT compared to the amount recommended by the Maintenance Decision Support System	<10% Winter 20-21	16%[12*] Winter 17-18		The percentage above the adjusted modeled optimal salt use declined by 2 percentage points between winter 16-17 and 17-18 due to increased awareness among snowfighters about the MDSS system. **Progress Needed: -6 percentage points**

*FY17 (Winter 16-17) was the first year of the Office of Maintenance's formal salt sustainability effort, which began the 5 year initiative to meeting no more than 10% over the adjusted MDSS recommendations. Data reported in RCA is entered by snow plow operators. Salt utilized to make salt brine is included in salt use reporting. Over the past 15 years, MnDOT and national partners developed a winter support tool known as the Maintenance Decision Support System (MDSS). MDSS incorporates real time weather forecasting and road infrastructure analysis to produce optimized salt application recommendations.MDSS recommendations may vary depending on the severity and lonevity of an event. This will lead to possible inconsistent recommendations during an event, but the overall season report will smooth out the highs and lows producing an average look at the winter.

Roadside Management

Background

Roadside vegetation serves many important engineering and safety functions that support transportation infrastructure. Vegetation promotes drainage, prevents erosion, manages stormwater, and controls invasive species. These functions are most effective and efficient when diverse, locally-adapted, native species are used.

MnDOT permanently seeded an average of 1,400 acres per year during the last five construction seasons. Using a native seed mix costs about twice as much per acre as using a non-native mix. However, native species also effectively create wildlife habitat, improve aesthetics, sequester carbon, and promote biodiversity. The added cost for native seed paid in 2018 was less than .01% of total MnDOT construction spending.

Strategy in the Spotlight: MnDOT Seeding Manual

The 2014 MnDOT Seeding Manual provides methods used to establish and maintain both general and native seed mixtures for roadside plantings throughout the state. The manual provides a basic guide for selecting and planting various seed mixes on MnDOT projects. Design engineers and maintenance workers use the manual to select a native seed mix that is well suited for their project and contributes to a resilient roadside over time.

Strategies and Tactics

Action Plan for Native Planting

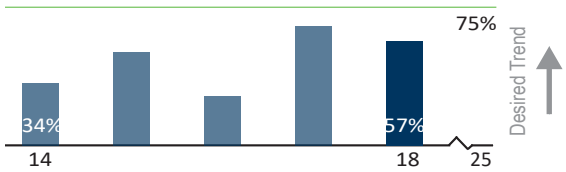
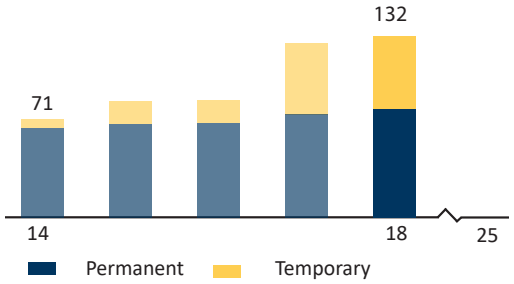
- Clarify guidance for design and construction
- Improve vegetation establishment by addressing obstacles during construction
- Improve establishment speed of native mixes
- Monitor long-term vegetation outcomes

Blowing and Drifting Snow Control Program

Blowing and drifting snow on Minnesota's roadways is a transportation efficiency and safety concern. By deploying blowing and drifting snow control measures such as proper grading, structural snow fences and living snow fences, minimizes the negative impacts blowing and drifting snow can have on Minnesota's economy and on the well being of its citizens. These measures can also reduce the need for plowing, which can fuel fuel consumption and salt use.

In 2017, MnDOT formally created a Blowing and Drifting Snow Control program to further integrate these cost-effective control measures into agency business practices.

Roadside Management

Metric	Target	Results	Trend	Analysis
Native Planting Total percentage of acres planted with native seeds as part of larger MnDOT projects	75% 2025	57%[13]		In 2018, 57% of highway acres on large MnDOT projects were planted using native seeds. Recently, native seed use has increased compared to the 10-year long term average of about 36%. Design guidance changes in 2014 contributed to this increase. **Progress Needed: +18 percentage points**
Snow Fences Total miles of structural snow fences, living plants, and corn rows installed to manage blowing and drifting snow	TBD	132 miles[14] Winter 18-19		Between 2017 and 2018 total snow fence miles increased 4%. Permanent snow fencing increased by nearly 5 miles and temporary snow fence miles increased by .5 miles.

Construction

Background

MnDOT is responsible for the following assets:

- 11,814 miles of state trunk highways
- 620 miles of sidewalk along state highways
- 1,133 miles of national and state designated bicycle routes

Construction activities currently focus on keeping the system in usable condition. This work can be categorized as:

- Preserving assets in good condition
- Repairing or rehabilitating aging assets
- Replacing or reconstructing assets that have come to the end of their useful life
- Modernization or expansion

Preserving existing "assets" (e.g., roads and bridges) typically has lower economic and environmental costs than new construction, replacement, or reconstruction because it requires less material acquisition, transportation, and processing. Examples of highway preservation include chip seals or micro-surfacing of asphalt pavement and minor patching and diamond grinding concrete. However, 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 provide the lowest overall impact during their service life.

Strategy in the Spotlight: Biobased Recycling

In 2018, MnDOT partnered with two private companies, Cargill and Hardrives, to test a Anova, a new plant-based asphalt product at the MnROAD research facilities along Interstate 94 near Albertville, MN. Anova is a new class of asphalt additives called rejuvenators that promise to reverse the effects of aging when the existing asphalt roadway is recycled back into the new road. The rejuvenator is a plant-based product, using plants rather than petroleum products, and is expected to reduce the cost of construction and allow for more pavement recycling.

Strategies and Tactics

Sustainable Construction

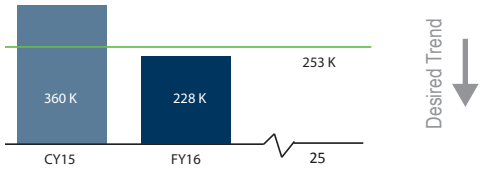
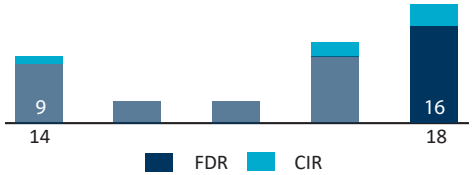
There are a number of newer cost-competitive pavement construction techniques with the potential to reduce lifecycle GHG emissions and extend pavement life. MnDOT continues to become more familiar with these practices and increase our use of these techniques. Some Minnesota counties are using these almost exclusively for their asphalt pavements.

- Cold In-Place Recycling (CIR)
- Full Depth Reclaimation (FDR)
- Warm Mix Asphalt (WMA)

Other strategies include expanding work or practices that we are already doing, including:

- Properly Timed Preservation Activities
- Long Term Fixes
- Implementing Advances in Recycled Materials

Construction

Metric	Target	Results	Trend	Analysis
Greenhouse Gas Emissions Total annual GHG emissions from the fuel and materials use to construct MnDOT projects*	252,573 metric tons CO_2e 30% reduction by 2025	228,245 metric tons CO_2e FY 2016		MnDOT projects generated fewer emissions between CY15 and FY16. Fewer miles of seal coating drove the 51% reduction. There were 1,189 miles of seal coat in CY15 compared to 600 miles in FY16. Further, FY16 included 21% fewer projects and smaller projects in general. 2018 data is not available. **Progress Needed: While MnDOT met the target for FY16 continuous effort is needed to meet it in future years.**
Sustainable Pavements Total annual number of jobs using warm mix asphalt (WMA), cold-in-place recycling (CR), or full depth reclamation (FDR)**	TBD	16		When asphalt pavement is used, WMA, CIR, and FDR reduce lifecycle GHG emissions compared to conventional pavement preservation techniques. MnDOT constructed 3 CIR projects and 13 FDR projects with a total of nearly 160 roadway miles in 2018.
Recycled Materials Total annual quantity of recycled materials used in MnDOT projects (e.g., recycled asphalt pavement and concrete fly ash)	TBD	TBD	Not currently tracked	MnDOT has a permissive specification that allows up to 20% recycled content in asphalt pavements. MnDOT does not track actual use, but plans to explore this in the future.

* Emissions from construction include inputs from the state-run construction program and vary by year based on program size

** Includes stabilized (SFDR) and non-stabilized full depth reclamation (FDR)

Transportation Options

Background

MnDOT plans for all the ways people and goods move throughout Minnesota—individually for each mode and sector (e.g. freight) and together as a multimodal system. The Statewide Multimodal Transportation Plan identifies overarching guidance and priorities for the entire transportation system. Other statewide transportation plans offer mode-specific strategies, guidance, and investment priorities for each part of the system. The plans include aviation, bicycle, freight, highway, pedestrian, ports and waterways, rail, and transit.

MnDOT's family of plans direct staff to plan, design, build, operate, and maintain transportation infrastructure and facilities to improve the safety of all users and the communities they travel through. This strategy is put into practice by engineers who design roadway infrastructure. While many MnDOT projects meet or will meet user needs, there is still an opportunity to encourage travelers to walk, bike, and use transit more often.

Strategy in the Spotlight: Complete Streets Design

St. James is a small town outside the Twin Cities Metro area. The project was initiated to reconstruct a section of Highway 4, upgrade city utilities, and provide ADA-compliant ramps. One of the community's primary goals was to create a safe place for people to get to businesses in the center of town. MnDOT presented the community with options, and then explained the performance expected from each one. The MnDOT project manager and the community decided to remove one of the travel lanes, reduce lane widths, and create back-in diagonal parking where there was once only a parallel option.

Strategies and Tactics

Statewide Pedestrian System Plan

The plan will make Minnesota a better place for people to walk along and across the trunk highway system while aligning existing state transportation policy. The plan process kicks off February 2019 and will be complete by winter of 2020.

Project Scoping Field Walks

In 2018, Districts recieved technical support for thirty-two projects to identify opportunities to install or enhance non-motorized infrastructure. This approach incorporates concepts from FHWA's Safe Transportation for Every Pedestrian countermeasures.

Safe Routes to School Pilot Demonstration Project

Guidance to develop, implement, and evaluate demonstration projects as a way to build support for safer walking and bicycling facilities. Phase one to be complete in July 2019.

Rural Pedestrian Research

Builds on Understanding Pedestrian Travel Behavior and Safety in Rural Settings to quantify safety concerns and identify and evaluate safety improvements in four tribal communities and ten additional rural community sites.

Safety Education Priorities

A pedestrian safety education resource and a public awareness campaign to promote safe driving and walking behaviors. Scope of work is being finalized and resources and materials are to be developed by summer of 2020.

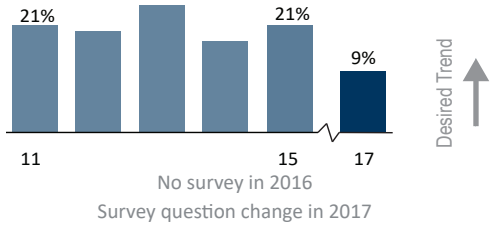
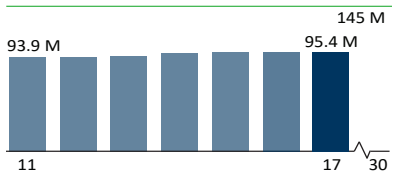
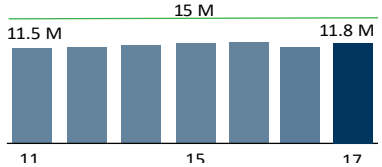
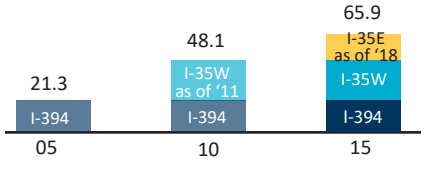
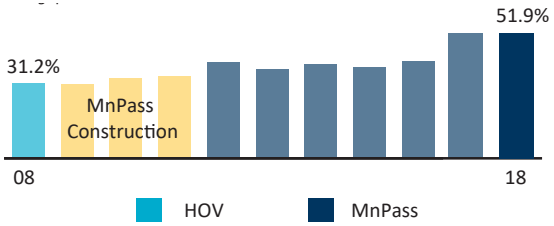
Pedestrian Safety Improvement at Signalized Intersections

A framework to identify where improvements for pedestrians can be made at signalized intersections on trunk highways. Framework to be complete winter 2019.

Bicycle Facility Design Manual

The 2019 Bikeway Facility Design Manual update is intended for MnDOT staff developing projects on the Trunk Highway System, and will provide guidance on bikeway development.

Transportation Options

Metric	Target	Results	Trend	Analysis
Frequency of Bicycling Percentage of survey respondents who biked at least once a week during April-October (In 2017, question changed to "daily/a few times per week")	Tracking indicator	9% 2017		From 2012 to 2015, the percentage of Minnesotans who bicycle at least once a week varied within a modest range. The lower percentage in 2017 is due to a change in the survey question from examining any bicycle use per week during the warm months of April-October to "daily/few times per week" in the last year, traveling to and from places.
Transit Ridership in the Twin Cities Boardings reported by public transit providers serving metro-area counties	145-150 million by 2030	95.4 million 2017		2017 ridership across these systems was down 1% with a majority of that decrease occurring on Met Council bus routes. The decline in Twin Cities transit ridership from 2016 was due in part to a fare increase in October 2017, low gas prices, and shifting travel patterns. Rail and bus rapid transit ridership grew in 2017 and transit providers continue to adjust services to match changing demand.
Transit Ridership in Greater Minnesota Annual boardings reported by public transit providers serving Greater Minnesota counties	15 million by 2015	11.8 million 2017		Transit ridership in Greater Minnesota rose in 2017 to 11.8 million boardings after dropping from record highs in 2015. The drop in ridership from 2015 to 2016 is due, in part, to service changes in several large urban systems. These service changes made routes more efficient, enabling riders to use buses with fewer transfers, which are counted as additional rides. Current Greater Minnesota ridership is below the legislative target to meet 90 percent of transit needs by 2025 (currently estimated at 17 million trips).
MnPASS Total miles of HOV/MnPASS Express Lanes	22.5 new miles Fall 2022	65.9 direct miles		The MnPASS Express Lane system consists of three corridors: I-394, I-35W and I-35E. Funding is secured for MnPASS extensions on I-35W in 2019 (Roseville to Blaine).
Person Throughput at I-35W & Black Dog Road Person throughput on northbound HOV/MnPASS Express Lane as share of the total person throughput during AM peak	N/A	51.9%[15]		Compared to NB I-35W general purpose lanes, the NB I-35W MnPASS lane carried 19% more people at Black Dog Road and 78% more people at Lake Street during the AM peak. Overall throughput decreased slightly because of the ongoing construction of 35W River Bridge and 35W Lake St. projects.

References

[1] Climate Overview – IPCC Report, October 2018

[2] US National Climate Assessment, November 2018

[3] MN Executive Order 19-25 Requires state agencies to achieve no less than an aggregate 30 percent reduction in energy use per square foot by 2027 from a 2017 adjusted baseline

[4] MnDOT B3 Annual Benchmarking Report, 2019

[5] MN Executive Order 19-27 Requires state agencies to achieve a 75% combined recycling and composting rate of solid waste by 2030

[6] RETRAC Recycling Report, March 2019, Includes heaquarters, truck stations and special sites, Does not include rest areas

[7] MN Statute, Sec. 115A.15, Subd.9. "Recycling goal" requires State agencies to recycle at least 60 percent by weight of the solid waste generated by state offices in the metropolitan area, and other operations located outside of the metropolitan area.

[8] MN Executive Order 19-27 Requires state agencies to achieve a 30% reduction of state fleet consumption of fossil fuels by 2027 relative to a 2017 adjusted baseline

[9] MnDOT M5 Fleet Management Software

[10] MnDOT Crystal Reports

[11] MnDOT Winter Maintenance Report, 2018

[12] MnDOT Resource Consumption Application, Business Intelligence Report, 2018

[13] MnDOT Annual Average Bid Prices Report, 2008-2018

[14] 2018 MnDOT Statewide Fact Sheet

[15] MnDOT Regional Transportation Management Center

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