Transportation in Minnesota: Partnerships, Target Setting, & Progress Towards Climate Goals

Tim Sexton
AASHTO 2018 Joint Summer Conference
July 19, 2018
Climate change will impact Minnesota more than any state outside Alaska

Transportation is the #1 source of GHG in Minnesota

We have ambitious goals for reducing GHG emissions from transportation

The exact path to achieving these goals is still unclear, but we know that partnerships will be critical
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Northern Minnesota warming faster

Change in average temperature from 1901-1960 to 1991-2012

- +3° Increase
- 2-3° Increase
- 1-2° Increase
- 0-1° Increase

Source: National Climate Assessment
**Timeline of Minnesota’s historic mega-rain events 1866-2014**

**1866-1965**
Four mega-rains in 100 years

- **Aug. 6, 1866**
  Killed 16 people in Fillmore County.

- **July 17-19, 1867**
  Known as the state’s greatest flash flood, in central Minnesota.

- **July 20-22, 1909**
  Extensive across northern Minnesota, killed 2 children in Duluth.

- **September 9-10, 1947**
  More than 8 inches in five hours at Hibbing.

**1966-1999**
Three mega-rains in 33 years

- **July 21-22, 1972**
  Nearly 11 inches in 24 hours at Ft. Ripley, state record at the time.

- **June 28-29 and July 1-2, 1975**
  Intense rain in northwestern Minnesota in two events.

- **July 23-24, 1987**
  9 inches at Minneapolis-St. Paul International Airport, a record.

**2000-2014**
Five mega-rains in 14 years

- **June 9-10, 2002**
  More than 12 inches in 48 hours in northern Minnesota.

- **Sept. 14-15, 2004**
  More than 10 inches in 36 hours in Faribault and Freeborn counties.

- **Aug. 18-20, 2007**
  15 inches near Hokah, state record for 24 hours.

- **Sept. 22-23, 2010**
  More than 10 inches at Amboy.

- **June 19-20, 2012**
  7 inches in two days in Duluth, St. Louis River at record level.

Source: Minn. Department of Natural Resources, State Climatology
<table>
<thead>
<tr>
<th>Climate Impact</th>
<th>Likelihood this will change in MN over next 20 years</th>
<th>Potential Negative Implications for the Transportation System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy precipitation / flooding</td>
<td>Very High</td>
<td>• Damage to highway and rail infrastructure, airport runways</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Flooded roads will slow operations and performance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Slope failures and erosion</td>
</tr>
<tr>
<td>Warmer winters</td>
<td>Very High</td>
<td>• More ice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reduced pavement conditions and life cycles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Downed power lines with ice storms</td>
</tr>
<tr>
<td>New species ranges</td>
<td>High</td>
<td>• Changes in roadside vegetation mixes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Soil erosion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Increase in invasive species populations</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Increased exposure of construction and maintenance crews to vector-borne diseases</td>
</tr>
<tr>
<td>High heat</td>
<td>Medium</td>
<td>• Pavement and rail buckling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Vehicles overheating</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Electrical system malfunctions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Limitations on construction hours</td>
</tr>
<tr>
<td>Drought</td>
<td>Low</td>
<td>• Reduced river navigability for barges</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Roadside vegetation stress, reduces rainwater storages and increases soil erosion</td>
</tr>
<tr>
<td>Wildfires</td>
<td>Unknown</td>
<td>• Road closures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Immediate and significant threat to human safety</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Damage to roadside infrastructure</td>
</tr>
</tbody>
</table>
Last month...

Highway 23 and Hwy 48 remain closed in Carlton, Pine Counties

Duluth, Minn. – The storms last weekend continue to cause problems in Carlton and Pine Counties in Minnesota. According to the Minnesota Department of Transportation, Highway 23 in Carlton County and Highway 48 in Pine County remain closed due to flooding.

Updated: June 20, 2018 02:48 PM

Highway 93 Closed from Henderson to Highway 169 Due to Flooding

Highway 93 is closed from Henderson to Highway 169 due to Rush River flooding.

June 10, 2018 08:36 PM

A stretch of highway southwest of the Twin Cities will remain closed until at least Monday morning.

Northern Minnesota

Southern Minnesota
Mudslide closes southern Minnesota highway

MPR News Staff · Jul 1, 2018

A mudslide forced the closure of State Highway 68 southeast of New Ulm, Minn., on Sunday, July 1.
2018. Courtesy of Minnesota Department of Transportation

Updated: 6:15 p.m. | Posted: 3 p.m.

A southern Minnesota highway has been closed after a mudslide Sunday left a "significant" amount of mud and fallen trees on the road.

The Minnesota Department of Transportation reported Sunday afternoon that the mudslide had closed State Highway 68 just south of Courtland, or about 5 miles southeast of New Ulm.
Last week...

Heavy rains drench an already soggy northern Minnesota

Heavy rains cause flooding, road closures in southwestern Minnesota

Northern Minnesota

South Central Minnesota
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Transportation is the new #1
Minnesota's greenhouse gas emissions from economic sectors 2005-2014

<table>
<thead>
<tr>
<th>Economic Sector</th>
<th>2005 Emissions (M)</th>
<th>2014 Emissions (M)</th>
<th>Change (%)</th>
<th>Change (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity Generation</td>
<td>54.7M</td>
<td>45.8M</td>
<td>-17%</td>
<td>-8.97M</td>
</tr>
<tr>
<td>Transport</td>
<td>37.1M</td>
<td>34.1M</td>
<td>-7%</td>
<td>-3.0M</td>
</tr>
<tr>
<td>Agriculture</td>
<td>24.8M</td>
<td>24.2M</td>
<td>-2%</td>
<td>-0.6M</td>
</tr>
<tr>
<td>Industrial</td>
<td>12.5M</td>
<td>15.2M</td>
<td>20%</td>
<td>2.7M</td>
</tr>
<tr>
<td>Residential</td>
<td>8.2M</td>
<td>9.8M</td>
<td>19%</td>
<td>1.68M</td>
</tr>
<tr>
<td>Commercial</td>
<td>6.0M</td>
<td>6.4M</td>
<td>20%</td>
<td>0.4M</td>
</tr>
<tr>
<td>Waste</td>
<td>0.3M</td>
<td>0.4M</td>
<td>8%</td>
<td>0.1M</td>
</tr>
</tbody>
</table>
Minnesota’s Forecasted GHG Emissions; 2011 - 2030
4 statements about Minnesota

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State and National Targets

State Targets

- **Next Generation Energy Act** reduce GHG emissions from 2005 baseline
  - 15% by 2015
  - 30% by 2025
  - 80% by 2050

Subnational Targets

- **Paris/US Climate Alliance**
- **“We’re Still In”**
- **Under 2 MOU**
## Transportation Sector Goals

<table>
<thead>
<tr>
<th>Metric</th>
<th>2025 Target</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sector Level</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total annual GHG emissions generated by Minnesota’s transportation system</td>
<td>29,500,000 tons CO₂e</td>
<td>40,300,000 tons CO₂e</td>
</tr>
<tr>
<td><strong>State Highway Construction</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total annual GHG emissions from the fuel and materials use to construct MnDOT projects</td>
<td>2,500,000 metric tons CO₂e</td>
<td>3,600,000 metric tons CO₂e</td>
</tr>
<tr>
<td><strong>MnDOT GHG emissions - Operations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Facilities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total annual GHG emissions generated by MnDOT-owned facilities</td>
<td>21,800 metric tons CO₂e</td>
<td>30,113 metric tons CO₂e</td>
</tr>
<tr>
<td><strong>Fleet</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total annual GHG emissions generated by MnDOT-owned fleet</td>
<td>26,500 metric tons CO₂e</td>
<td>37,766 metric tons CO₂e</td>
</tr>
</tbody>
</table>

*2016 MnDOT Sustainability Report*
4 statements about Minnesota

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Transportation Options
## Transportation Options

### System Use

#### Frequency of Bicycling
Percentage of survey respondents who biked at least once a week during the bicycling season (Apr - Oct)

<table>
<thead>
<tr>
<th>Metric</th>
<th>Target</th>
<th>Results</th>
<th>Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tracking indicator</td>
<td>21% 2015</td>
<td>21% 2011, 21% 2015</td>
<td></td>
</tr>
</tbody>
</table>

#### Transit Ridership in the Twin Cities
Boardings reported by public transit providers serving metro-area counties

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<thead>
<tr>
<th>Metric</th>
<th>Target</th>
<th>Results</th>
<th>Trend</th>
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<tbody>
<tr>
<td>2030</td>
<td>145-150 million</td>
<td>96.2 million 2016</td>
<td>Desired Trend</td>
</tr>
</tbody>
</table>

#### Transit Ridership in Greater Minnesota
Annual boardings reported by public transit providers serving Greater Minnesota counties

<table>
<thead>
<tr>
<th>Metric</th>
<th>Target</th>
<th>Results</th>
<th>Trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>15 million</td>
<td>11.7 million 2016</td>
<td>Desired Trend</td>
</tr>
</tbody>
</table>
Adding Person Throughput

One Tool = High Occupancy Tolling (HOT) lanes

- 73 miles (2017)
- 95 mile (goal by Fall 2022)
• Goal: Remove 20,000 private cars from Twin Cities roadways in next five years and 50,000 in ten years
  - Attract 30,000 new daily transit riders
  - Sustain 600 total car share vehicles
  - Add 800 bike share bikes
  - Add 1,000 daily vanpool users
  - Add 2,000 micro-transit and ride-splitting users
Connected and Automated

CAV Strategic Plan

- Long Range Planning
- Capital Needs
- Research
- Partners
- Operation
- Regulation
- Strategic Staffing
- Multi-Modal
- Outreach
Electric

Annual EV Registrations

2018

6,000+

2030

200,000

*Source: All charts developed by Minnesota Pollution Control Agency

Minnesota Electric Vehicle Roadmap

Minnesota Department of Transportation
Minnesota Pollution Control Agency
Great Plains Institute

2018
• Research, standards, funding, litigation, others...
Thank you!

Tim Sexton

Timothy.sexton@state.mn.us

Minnesota Commissioner of Transportation, Charlie Zelle, charging his Chevy Volt PHEV
Conceptual Adaptation Screening Framework

- Silver Creek
- Spring Valley

Performing well under current conditions:
- Significant Alteration
- Small Improvements
- No Adaptation Needed

Performing poorly:
- Significant Alteration

Social Cost if Compromised: High

Performing poorly under current conditions: