Advanced Data Analytics Inform Reduction of Snowplow Fuel Use

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Introduction

SNOWPLOWS CONSUME SUBSTANTIAL FUEL TO KEEP ROADS SAFE.

REDUCING FUEL HELPS MNDOT MEET SUSTAINABILITY GOALS AND LOWER COSTS.

STUDY ANALYZED ONBOARD VEHICLE DATA TO UNDERSTAND IDLING AND SNOWFALL IMPACTS.

Why It Matters

MnDOT spends $2M annually on diesel for plowing.

Goal: 30% GHG reduction from 2005 levels by 2025.

Transportation = 1/3 of total GHG emissions; heavy-duty trucks significant contributions.

Data Collection

600 MnDOT plows equipped with mobile data tech.

Real-time data: location, speed, weather, materials, fuel rate.

Integrated into Maintenance Decision Support System (MDSS).

Project Goal

- Investigate impact of idling and snowfall on fuel consumption.
- Use historical snowplow data (2018-2022 winters).

Idling Analysis

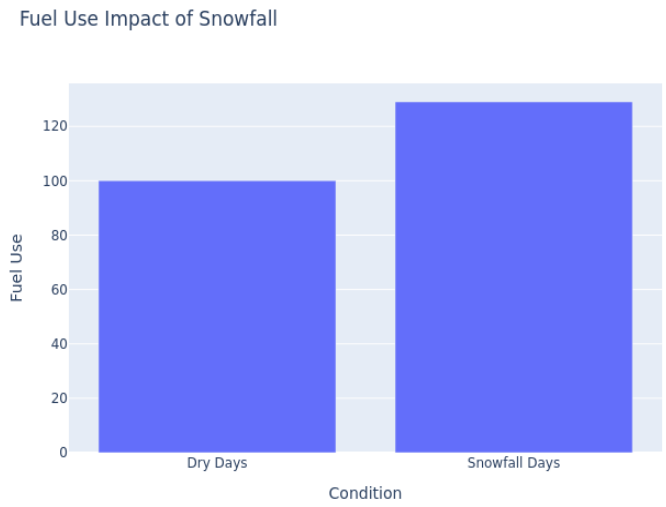
- Defined as ≥ 3 minutes motionless.
- Data: GPS, engine RPM, fuel rate.
- 978 vehicles analyzed, 232,000 hours of usable data.

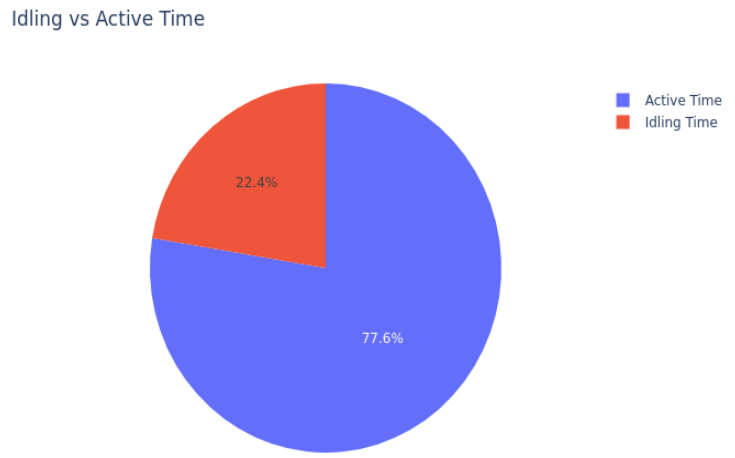
Snowfall Analysis

- Statistical algorithms on 41 plows, 4,300 trips.
- Compared dry vs. snowfall days.
- Considered velocity, elevation, and road resistance.

Key Findings

- Idling: 280,000 events, 52,000 hours (1/4 of active time).
- 50,000 gallons fuel used while idling.
- Snowfall: 4+ inches → fuel use ↑ 29% vs. dry days.





Implications

- Snow fences reduce plowing needs and improve fuel economy.
- Data-driven strategies: routing changes, snow mitigation.
- Confidence in tech for analyzing fuel hotspots.

What's Next

- Focus on reducing idling at garages.
- Integrate multiple data source for efficient operations,
- No new research planned, but ongoing optimization.

Thank You!

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