Demonstrating Distance Based Fee with Shared Mobility Fleets

Mileage-Based User Fee Alliance Webinar

March 24, 2022

https://dbf.dot.state.mn.us/

DEPARTMENT OF TRANSPORTATION

Organizational Construct

TECHNICAL ADVISORY COMMITTEE

Policy Oversight

Future Strategy & Guidance

U.S. Department of Transportation Federal Highway Administration

Project Sponsorship & Evaluation

Project Manager

DEPARTMENT OF TRANSPORTATION

Auditing & Compatibility

DEPARTMENT OF REVENUE

Communications

DEPARTMENT OF TRANSPORTATION

Technology Services

HOURCAR

VSI Labs

Policy & Research

HUMPHREY SCHOOL OF PUBLIC AFFAIRS
UNIVERSITY OF MINNESOTA

Implementation

WSP

Partners

DEPARTMENT OF TRANSPORTATION	**Project Sponsor**
WSP	**Systems Integrator and Lead Designer**
HUMPHREY SCHOOL	**Policy, Research, and Evaluation**
HOURCAR	**Local, Non-profit Carshare Provider**
zipcar	**National, Carshare Provider with Twin Cities presence**
VSI Labs	**Connected/Automated Vehicle Research Partner. Data Repository host**
DEPARTMENT OF REVENUE	**Mock audit support. Financial report evaluator**

Demonstration Operations and Research Partners

HOURCAR

- Non-profit car sharing service
- Operations in the Twin Cities and Rochester

ZIP CAR

- Car sharing provider
- Operations in major US cities as well as Canada and United Kingdom

VSI LABS

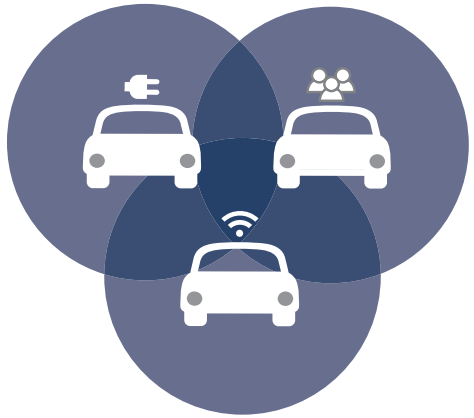
- Minnesota-based active safety and automated vehicle research
- Provided automated vehicle for use in demonstration

Minnesota's Distance – Based Fee Guiding Principles

- Electric, alternative fueled, and other highly efficient vehicles should be charged a proportionate share for use of the roads. A migration…, not a transformation.
  - Continue the "User Pays" tax principle embodied in the motor fuel tax
  - Charge for miles driven rather than fuel purchased, where and when appropriate
- Maintain the motor fuel tax
- DBF policies and collection costs must be reasonable
- Vehicles are becoming personal communications devices
  - Use (native) embedded telematics to test and understand enhance efficiency
  - Enables high degree of precision in collecting fees

Minnesota's DBF Project Design Approach

- Use of embedded telematics as the platform for fee collection to find efficiencies, improve compliance, develop scalable and portable model for DBFs
- Considered a range of options including TNCs and OEMs
- Formed partnerships
  - Two car-share fleets; HOURCAR & Zipcar
  - Automated vehicle company; VSI Labs

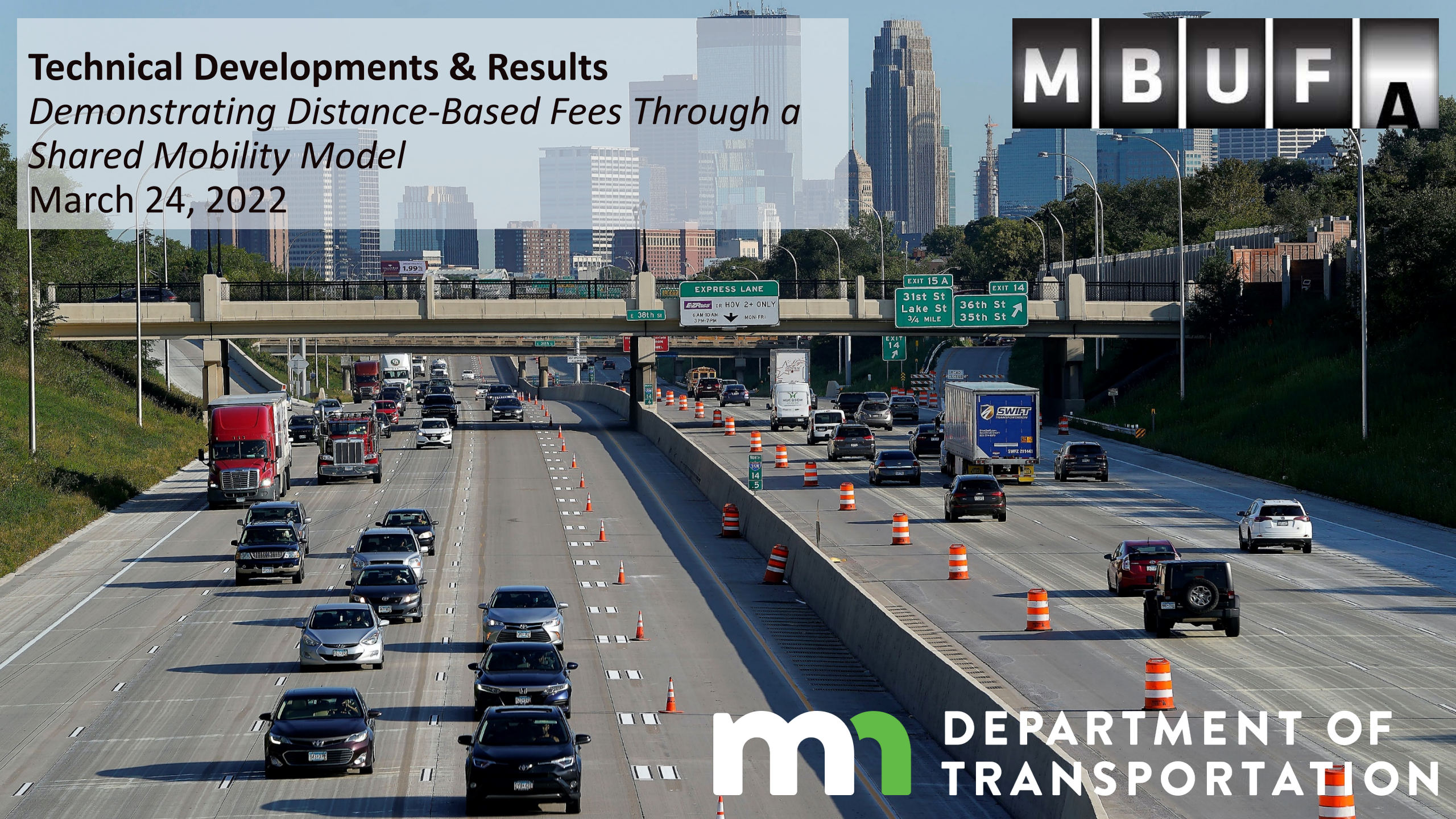


- Supporting research on financial analysis, modal and social equity, administrative costs, rural/urban equity, and rate setting, evaluation
- Understand how we can **leverage this learning** to apply to broader deployment models
  - Rationally, Systematically, Incrementally, Affordably, Scalable

Technical Developments & Results

Demonstrating Distance-Based Fees Through a Shared Mobility Model

March 24, 2022



MBUFA

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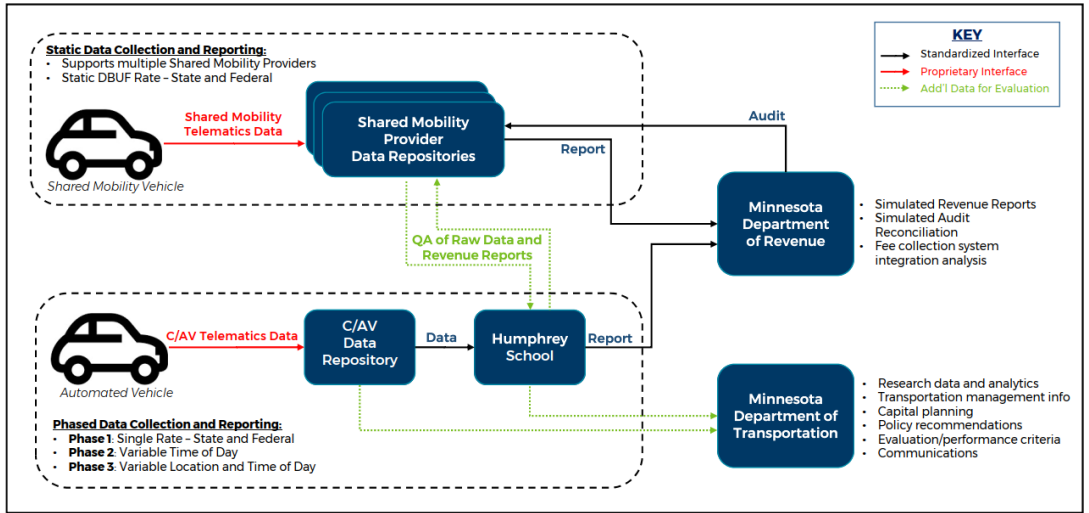
Design Activities

- **Concept of Operations** – Describes the functional, administrative, and operational scenarios for the demonstration
- **Systems Architecture Diagram** – Major systems and subsystems and data flows
- **Demonstration Implementation Plan** – Step by step guide for deploying the demonstration
- **Business Requirements** – Operational specifications
- **Technical Requirements** – Specific technical specifications
- **Interface Control Document** – System to System and Subsystem Interface Specifications
- **Verification Cross Reference Index (VCRI)** – Matrixed listing of requirements and pass/fail criteria and thresholds
- **Audit Guide** – Procedure for conducting financial audit
- **Test Plans and Procedures**
  - Unit Testing – Component Level Testing
  - Integration Testing – Testing of major units and vendors
  - Acceptance Testing – Demonstration system functional testing
  - Proof of Concept – Fully functional demonstration
- **Proof of Concept –** Two-week functional pre-test and data check



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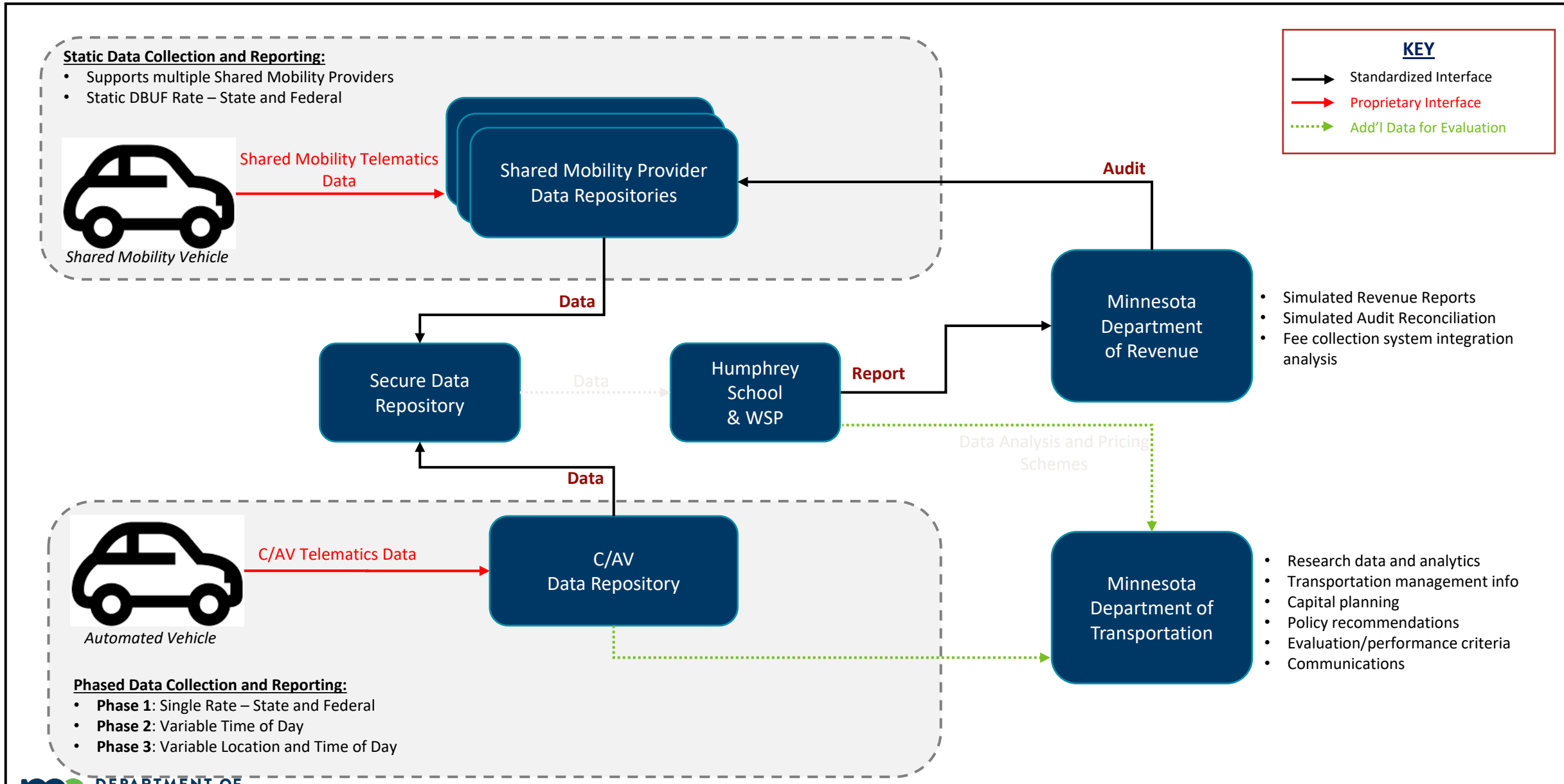
Minnesota Distance-Based User Fee Demonstration – Proof of Concept & Stage 1



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Minnesota Distance-Based User Fee Demonstration – Stage 2

Static Data Collection and Reporting:
- Supports multiple Shared Mobility Providers
- Static DBUF Rate – State and Federal

Shared Mobility Vehicle

Shared Mobility Telematics Data

Shared Mobility Provider Data Repositories

KEY
- Standardized Interface
- Proprietary Interface
- Add'l Data for Evaluation

Audit

Data **Report**

Secure Data Repository

Data

Humphrey School & WSP

Minnesota Department of Revenue

- Simulated Revenue Reports
- Simulated Audit Reconciliation
- Fee collection system integration analysis

Data Analysis and Pricing Schemes

Data **Report**

Automated Vehicle

C/AV Telematics Data

C/AV Data Repository

Minnesota Department of Transportation

- Research data and analytics
- Transportation management info
- Capital planning
- Policy recommendations
- Evaluation/performance criteria
- Communications

Phased Data Collection and Reporting:
- **Phase 1**: Single Rate – State and Federal
- **Phase 2**: Variable Time of Day
- **Phase 3**: Variable Location and Time of Day

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Minnesota Distance-Based User Fee Demonstration – Stage 3

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- Supports multiple Shared Mobility Providers
- Static DBUF Rate – State and Federal

Shared Mobility Vehicle

Shared Mobility Telematics Data

Shared Mobility Provider Data Repositories

Audit

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Report

Minnesota Department of Transportation

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KEY
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Demonstration Operations

Final By the Numbers

Total Trips	Total Reservations	Total Miles Traveled	Total Fuel Gallons Purchased	Average Fuel Economy (miles per gallon)
48,948	16,316	565,389	18,068.83	31.32

Total Gross Distance Based Fees (DBF) *(state and federal)*	Total Gross Fuels Tax Credits *(state and federal)*	Net Total DBF Assessed *(simulated)*
$15,358.67	$8,474.20	**$6,884.47**

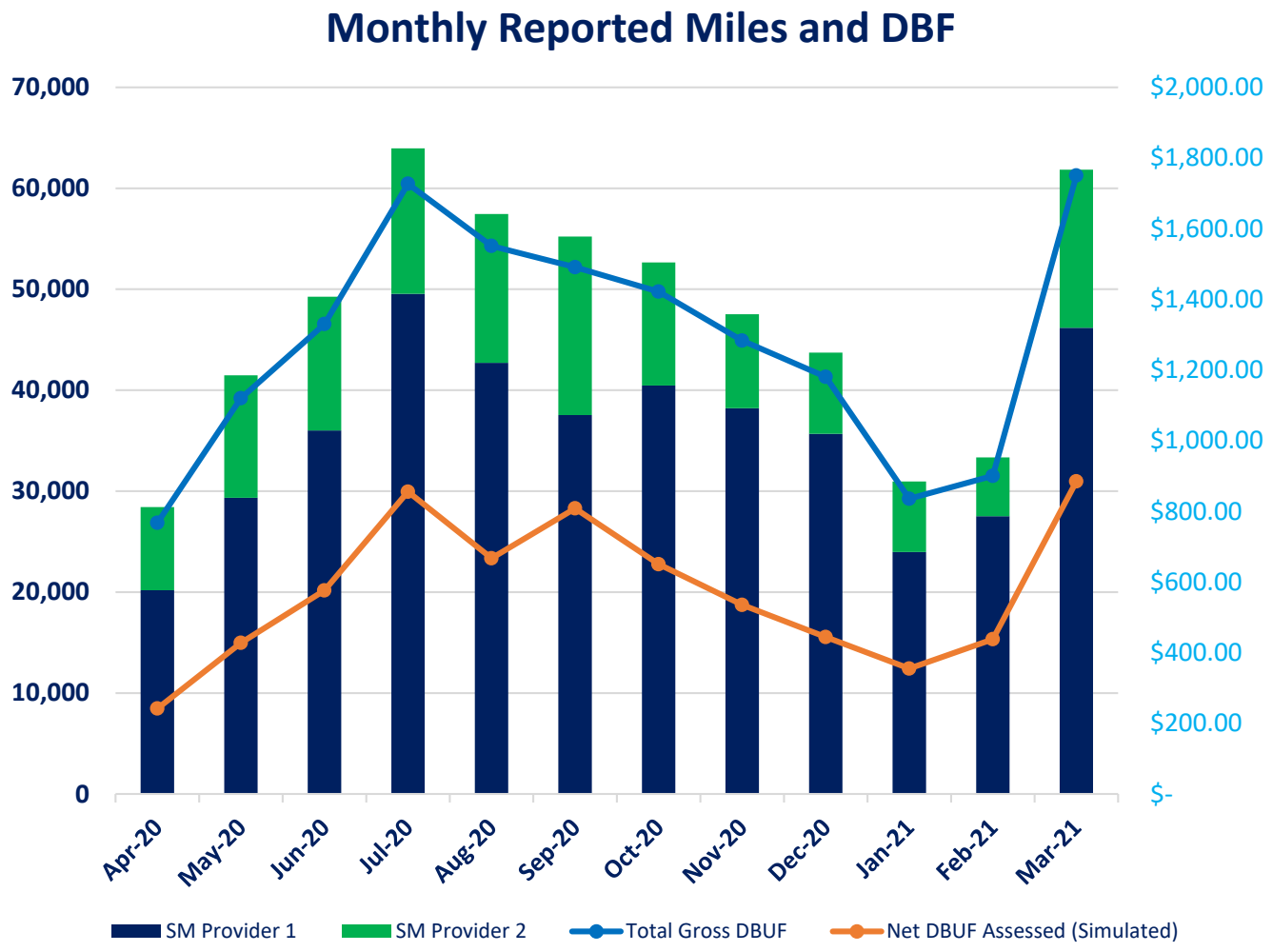
As of data reported through March 30, 2021

- **2 Shared Mobility Providers**
- **61 total vehicles have participated / collected data**
- **64 active vehicles**
  - ***Some vehicles are not utilized every month or have been decommissioned***

Demonstration Operations

Final Monthly Averages

- 47,153 Reported Miles
- 1,505.7 Gallons Purchased
- $1,279.89 Gross DBF
- $573.71 Net DBF *(After Fuel Tax Credits)*
  - $329.32 State DBF
  - $244.38 Federal DBF



Demonstration Accomplishments

- ✓ Safely and securely captured data from onboard telematics to assess distance-based fees on Shared Mobility fleets and from an Automated Vehicle employed in the demonstration
- ✓ Used AV technology for lane determination to potentially integrate DBF with Express Lanes
- ✓ Conducted an in-depth GAAP-based financial and operational audit with a Department of Revenue
- ✓ Established occupancy considerations for assessing a distance-based fee
- ✓ Developed a rate-setting framework for establishing distance-based fees
- ✓ Simulated collection of both State and Federal DBF (MFT equivalent)

Minnesota's Distance Based Fee Demonstration

Lessons Learned & Next Steps

2022

Christopher Berrens, Planning Director Transportation

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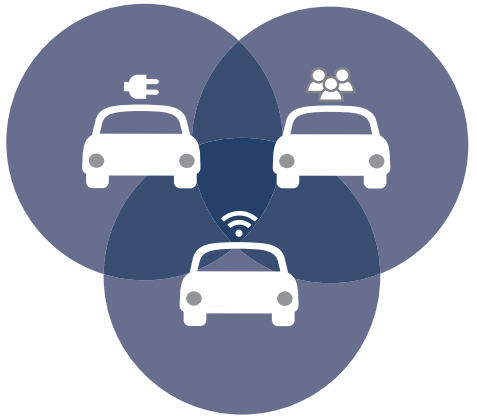
Lessons Learned
Where we started

1. A distance base fee model can leverage rapidly advancing electrification/alternative fuels, shared fleets, and vehicle automation

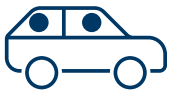


2. Prove that on-board embedded technology in shared fleets and automated vehicles can be used to efficiently and effectively collect distance based fees (DBF)

Lessons Learned
Key Findings

Fleets provide an accurate and reliable path for DBF administration and scalability

Embedded telematics (vehicle computer) in most of today's vehicles are effective and efficient aggregators of a DBF



Vehicle occupancy can be verified

A parallel revenue system will be needed for decades

Lessons Learned
Feasibility + Scalability

The Stream of Feasibility
for implementing a distance based fee

Automated Vehicles

Fleet operated vehicles

HOURCAR

amazon

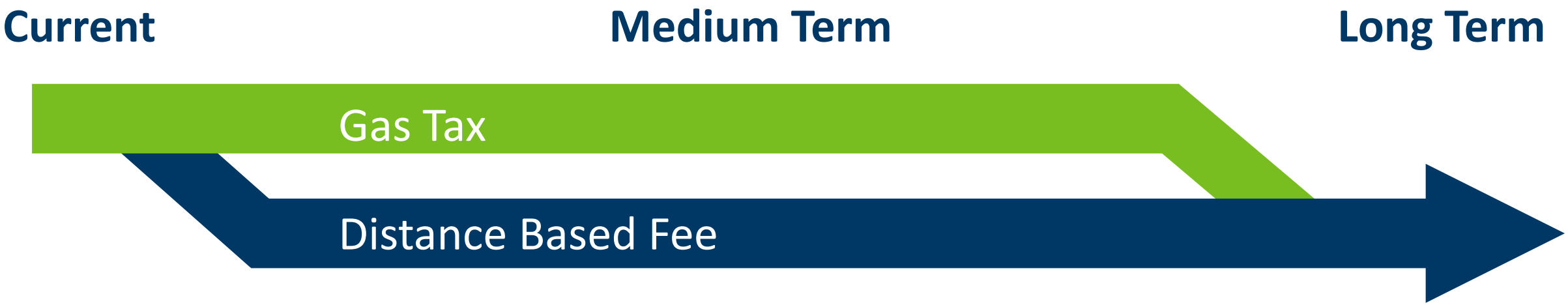
lyft

Vehicle Plug-in Port

Smartphone GPS Apps

Lessons Learned

Parallel revenue systems for many years



Lessons Learned

Parallel revenue systems for many years

Gas Tax
(Yesterday's Vehicles)

Revenue Approach

Efficient and effective revenue collection at the pump continues

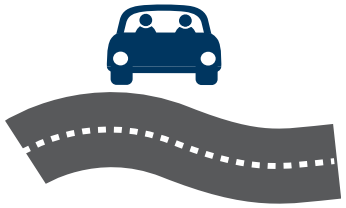
Climate Goals

The gas tax functions as a tax on carbon and can continue for years to come

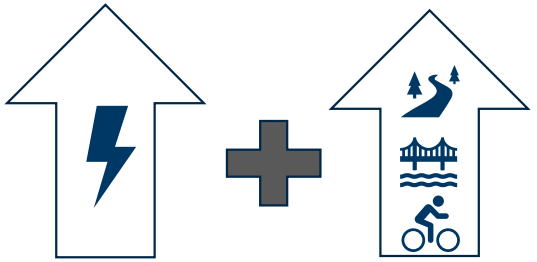
Plain Communication

Maintain the same revenue approach for a vehicle that did not change

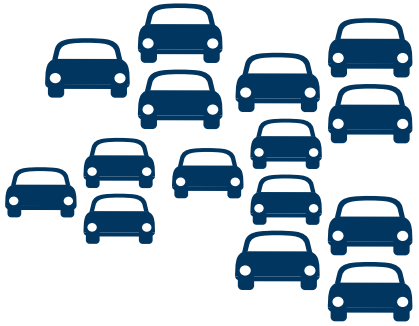
Distance Fee
(Today + Tomorrow's Vehicles)



A fee is charged based on the miles driven



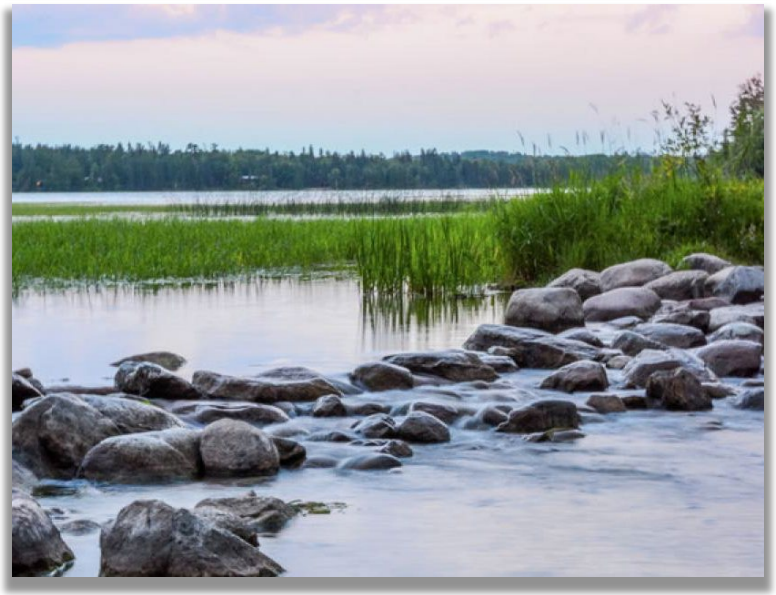
Developing a long-term model for distance fees can function alongside near-term objectives for EV adoption (e.g. distance fee tax credits in the near-term)



As people change to different vehicles so does the revenue approach

Next Steps

- Communication, education videos, and outreach
- Continue working with Kansas' DBF pilot evaluating rural and freight topics
- Support MN Rep. Elkins' proposed legislation

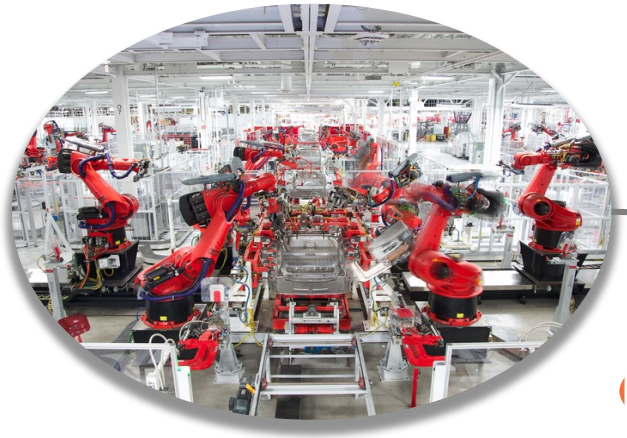


Next Steps

The Stream of Feasibility

for implementing a distance based fee

Vehicle Manufacturers



Fleet operated vehicles

HOURCAR

amazon

lyft

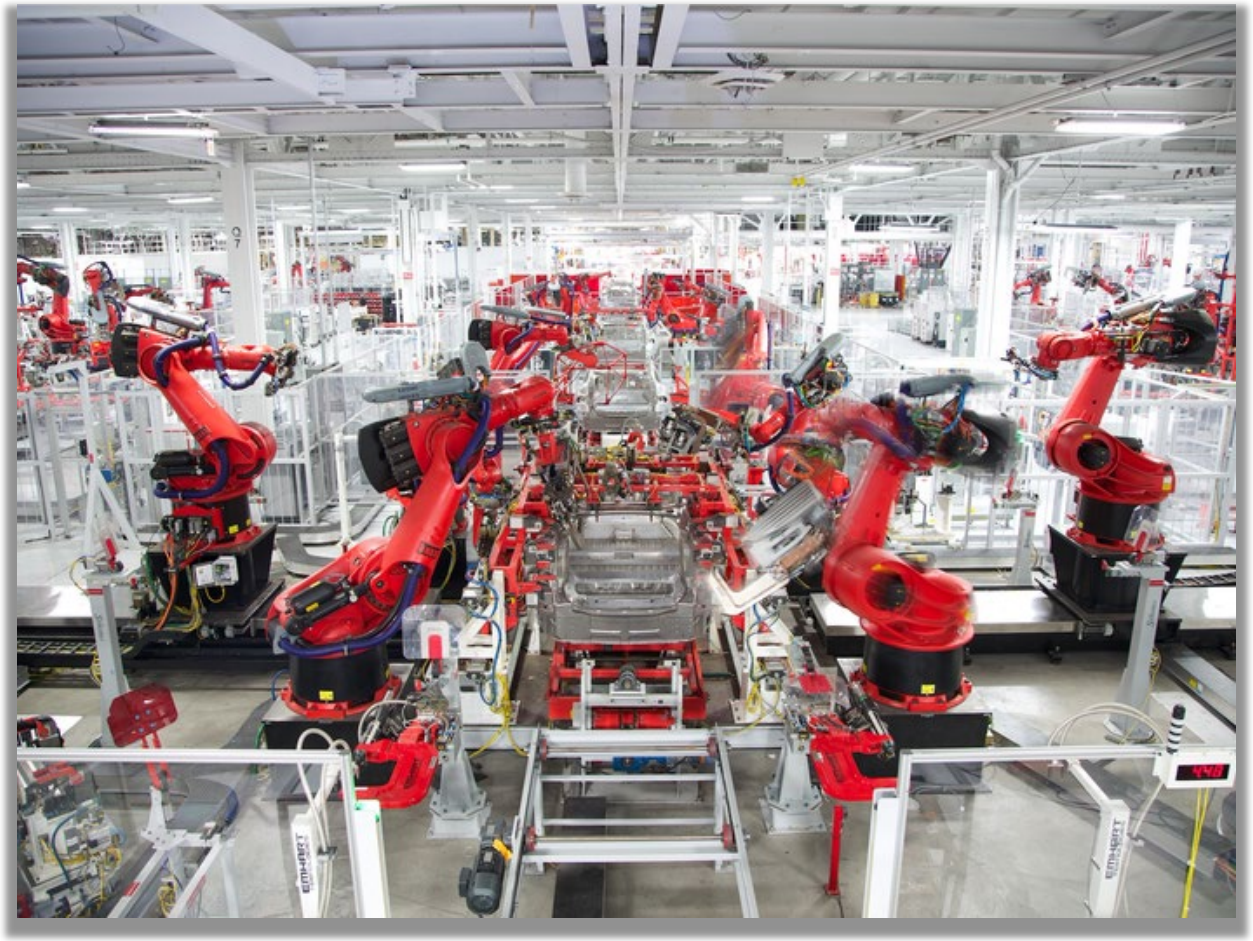
Automated Vehicles

Vehicle Plug-in Port

Smartphone GPS Apps

Next Steps

MnDOT in partnership with an original vehicle manufacturer (OEM) has applied for funding of a next phase distance based fee demonstration of embedded telematics built into vehicles at the factory. We will know in March of 2022 if this is accepted by FHWA



Policy Considerations

Frank Douma, Camila Fonseca-Sarmiento,
Jerry Zhao, Adeel Lari, Lee Munnich,
Meredith Benesh

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Policy Considerations

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- The process of collecting revenue includes implicit choices
- Depending on these choices, some pay more, some pay less
- In a perfect world, these choices reflect explicit policy directives
- Our world is not perfect, but to get closer, it helps to isolate some issues

Potential SM Providers' Contributions with Different Fleet Composition

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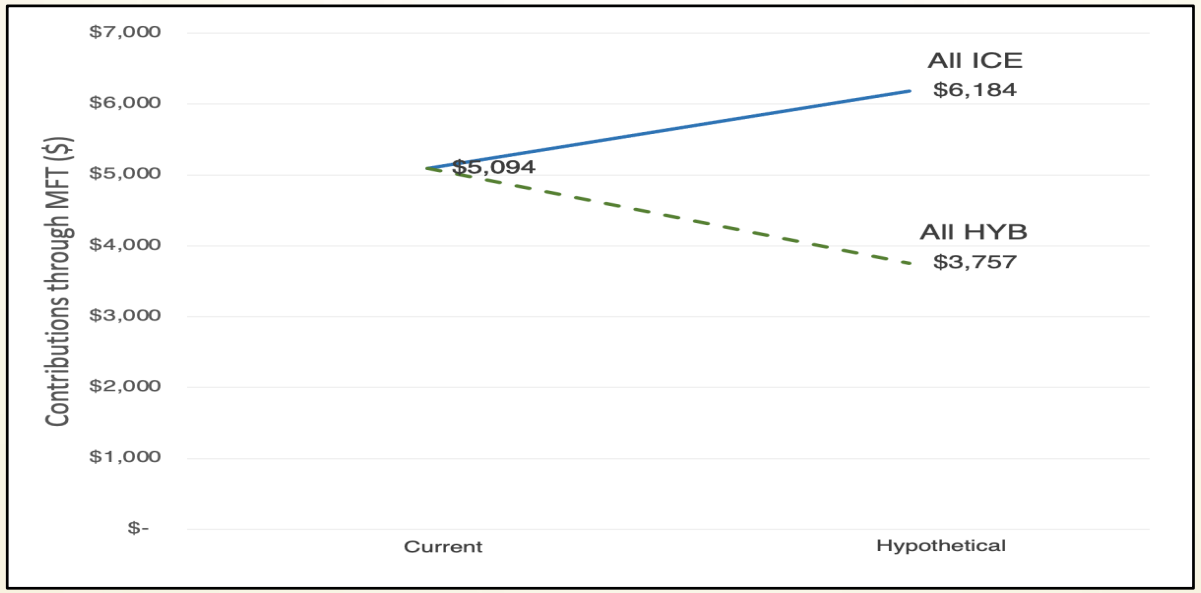

Current Scenario		All-EVs Scenario	
Number of vehicles	62	Number of vehicles	62
VMT	529,076	VMT	529,076
Gallons of fuel	17,819	Gallons of fuel	-
MFT revenue	$5,078	MFT revenue	$ -
EV-fee revenue	$ -	EV-fee revenue	$ 4,650
Price per mile (cents per mile)	0.96	Price per mile (cents per mile)	0.88

Difference in Revenue	-8.4%

Equity Issues

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Inequities in DBF vs MFT

Themes	Reasons
Inequities of a DBF	*Low-income people paying more for traveling longer distances *Exacerbating disparities based on accurate payment for road damage between large and small vehicles *The need for of a bank account
DBF as equitable solution	*DBFs could become more equitable than the current motor fuel tax
Depends	*How DBF is instituted *DBF pricing structure *DBF revenue allocation *Changes to other transportation revenue sources
Pricing Structure options	*Different charges by vehicle type *Congestion pricing *Pollution / fuel efficiency charges *Income allowance

Administrative Costs

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Previous Distance-Based Fee Demonstrations have shown higher costs than the motor fuel tax system.

- As a share of total revenue collected
  - DBF system: 5% to 13%
  - MFT: less than 1%
- Per vehicle mile traveled (VMT)
  - DBF system: $1.79 to $65 per 1,000 VMT
  - MFT: $0.10 per 1,000 VMT

Baseline Fee

Table 2-1: Baseline DBF rate for the State of Minnesota

Year	VMT (1)	MFT	EV fee (2)	DBF (¢/VMT) (3)
2015	58,124,883,776	$888,000,000		¢1.532
2016	58,856,547,322	$899,000,000		¢1.531
2017	59,970,745,402	$911,000,000		¢1.523
2018	60,438,313,272	$926,000,000	$196,050	¢1.536
2019	60,730,981,154	$938,000,000	$399,300	¢1.549

- Considering other administration costs:

Admin Costs (% of revenue collected)	**0.25%**	**5%**	**10%**	**15%**
DBF (cents per mile)	1.549	1.622	1.700	1.777

Table 3-1: Hypothetical DBF Revenues

	MFT	DBF_1 (0.25% costs)	DBF_5 (5% costs)	DBF_10 (10% costs)	DBF_15 (15% costs)
SM Contribution	5,094	8,611	9,017	9,451	9,879
Change (base-MFT)		*69.0%*	*77.0%*	*85.5%*	*93.9%*
-Admin Costs	**13**	**22**	**451**	**945**	**1,482**
Highway Revenue	5,081	8,590	8,566	8,506	8,397
Change (base-MFT)		*69.0%*	*68.5%*	*67.3%*	*65.2%*

Trade-Offs Ahead

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Motor Fuel Tax	Flat DBF	DBF with Congestion / Equity/ Environmental Considerations
Regressive	Regressive	Can account for income
Promotes fuel efficiency	No fuel efficiency incentive	Can promote fuel efficiency
Rural users pay more	Likely no difference from MFT	Rural users may pay less
Extremely efficient	Administratively simple	Complex
No identifiable information collected	Can Protect Privacy	May require PILI*

*Protection of PILI will depend upon data collector / aggregator

Questions?

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Thank you!

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Ken Buckeye – Project Manager

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Office of Financial Management