Making Traffic More Efficient

Minnesota Legislative Energy Commission
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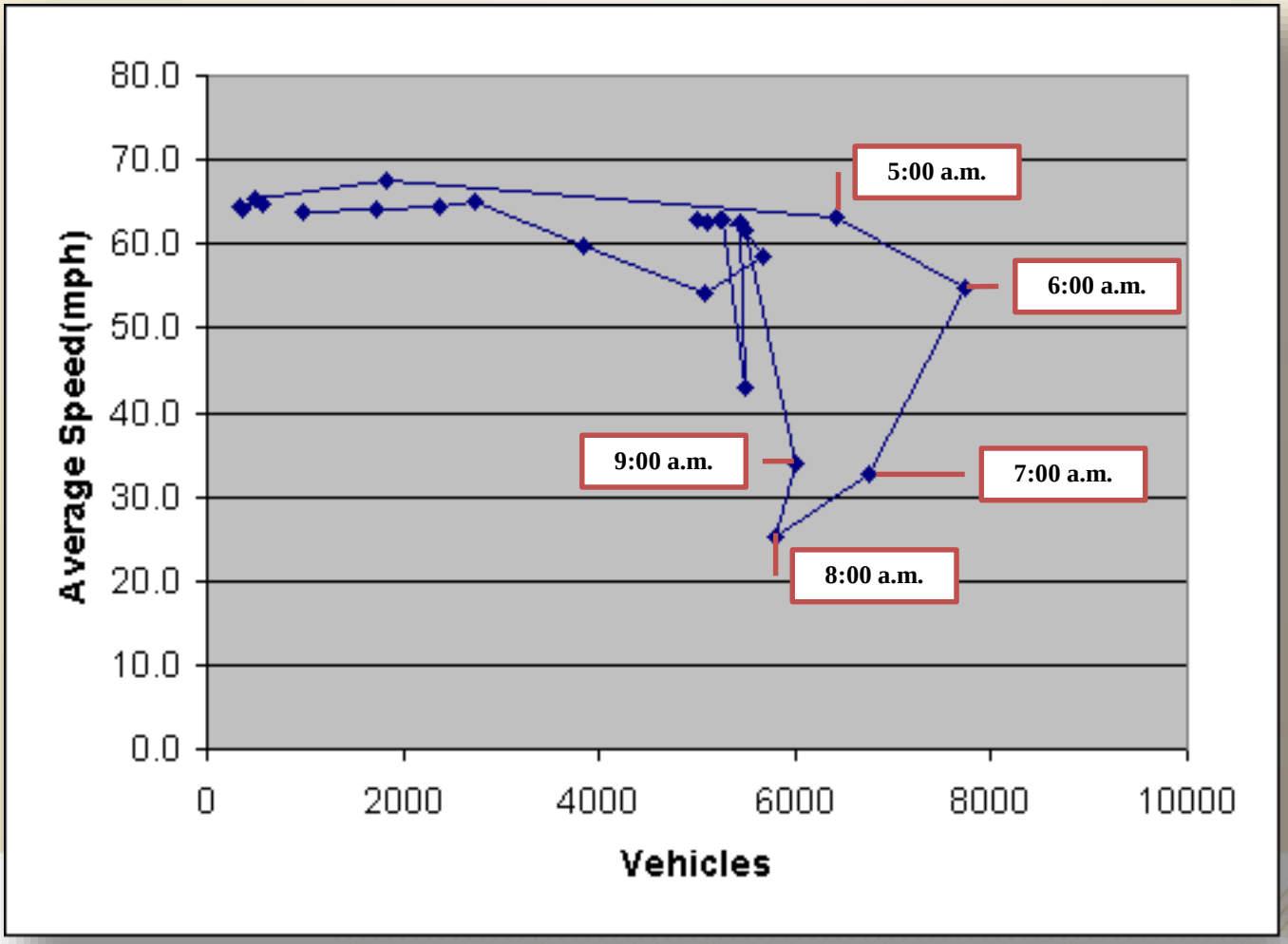
Issue

- Urban congestion results in greater energy use and environmental damage as well as wasted time and economic inefficiency.
- Increased use of transit, biking, walking, telework and transit-oriented development can contribute to lower energy use.
- Linking congestion pricing with transit and land use strategies can lead to greater energy and economic efficiency.

Operational Inefficiency without Pricing



I-66 Inbound, Outside Capital Beltway

Monday Morning, March 5, 2007

Road Pricing Categories

Name	Description	Objectives
Road toll (fixed rates)	A fixed fee for driving on a particular road.	To raise revenues.
Congestion pricing (time-variable)	A fee that is higher under congested conditions than uncongested conditions, intended to shift some vehicle traffic to other routes, times and modes.	To raise revenues and reduce traffic congestion.
Cordon fees	Fees charged for driving in a particular area.	To reduce congestion in major urban centers.
HOT lanes	A high-occupant-vehicle lane that accommodates a limited number of lower-occupant vehicles for a fee.	To favor HOVs compared with a general-purpose lane, and to raise revenues compared with an HOV lane.
Distance-based fees	A vehicle use fee based on how many miles a vehicle is driven.	To raise revenues and reduce various traffic problems.
Pay-As-You-Drive insurance	Prorates premiums by mileage so vehicle insurance becomes a variable cost.	To reduce various traffic problems, particularly accidents.
Road space rationing	Revenue-neutral credits used to ration peak-period roadway capacity.	To reduce congestion on major roadways or urban centers.

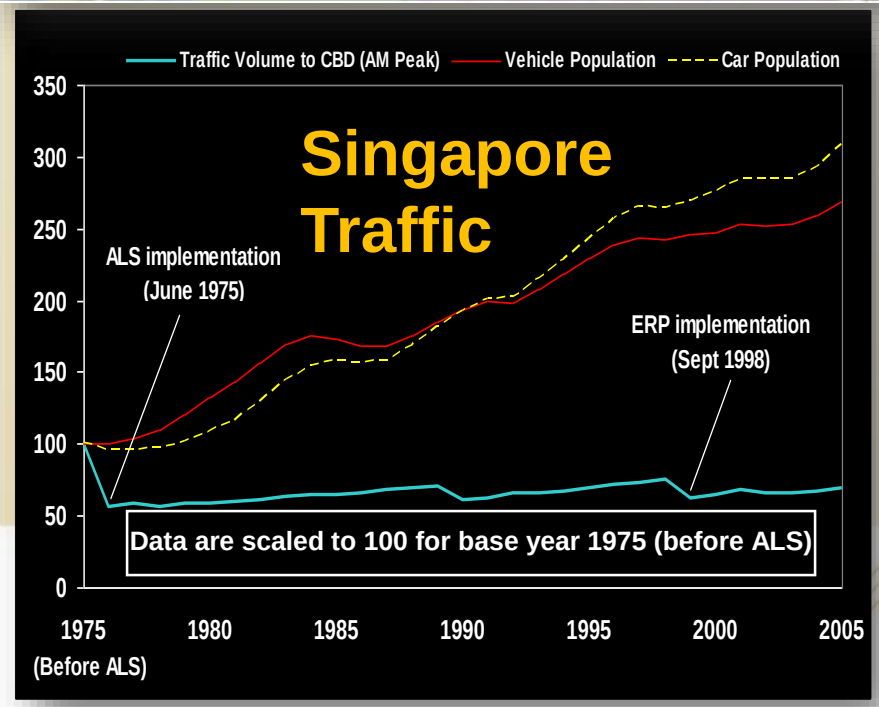
Source: Victoria Transport Policy Institute http://www.vtpi.org/tdm/tdm35.htm

Road Pricing Benefits

Strategy	Revenue Generation	Congestion Reduction	Pollution Reduction	Increased Safety
Road toll (fixed rates)	3	2	1	1
Congestion pricing (time-variable)	2	3	2	1
HOT lanes	1	2	1	0
Cordon fees	2	3	1	1
Distance-based fees	3	2	2	2
Pay-As-You-Drive insurance	0	2	2	3
Road Space Rationing	0	3	1	1

Rating from 3 (very beneficial) to –3 (very harmful). A 0 indicates no impact or mixed impacts.

Source: Victoria Transport Policy Institute http://www.vtpi.org/tdm/tdm35.htm



Singapore Uses Road Pricing to:

- Manage roads for highest productivity
- Cut pollution, fuel use, CO_2, congestion
- Generate revenue for public transport & high performance transport infrastructure/services

Singapore in the 70's…

Source: LTA

Singapore today…
after 30 years of road pricing

Public transport mode share rose from 40% to 67% while incomes rose 10 fold

Program has grown from simple cordon charge to over 70 charging points on 2 cordons, ring road and major arterial roads

Land Transport Authority

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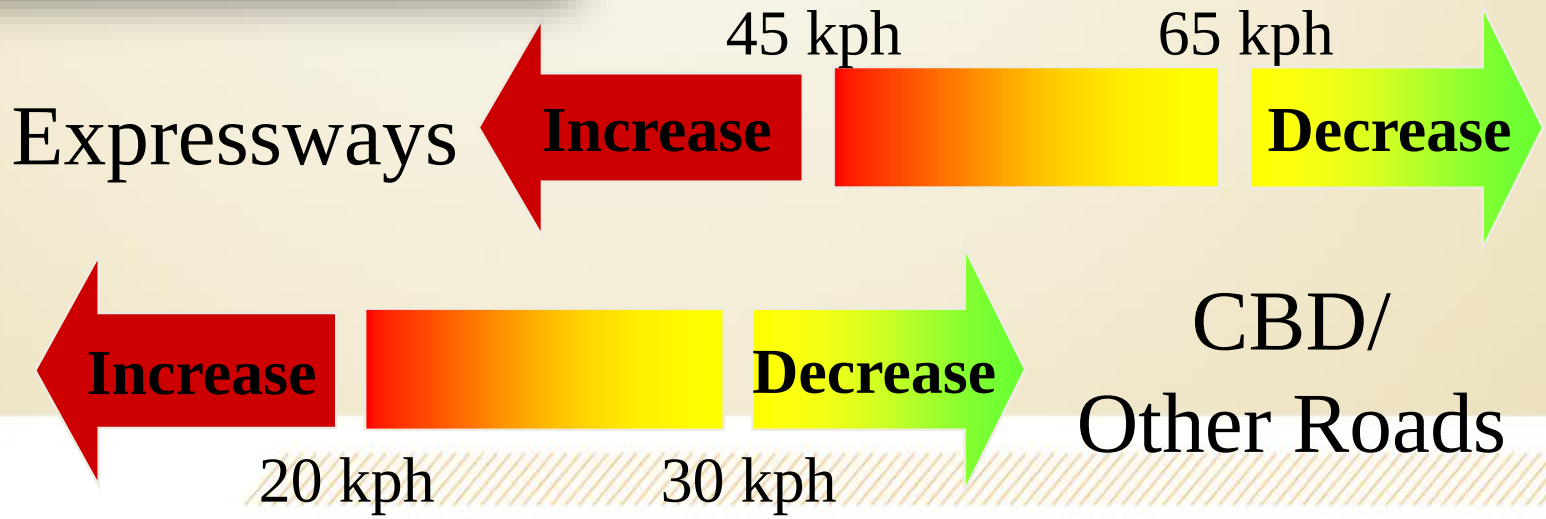
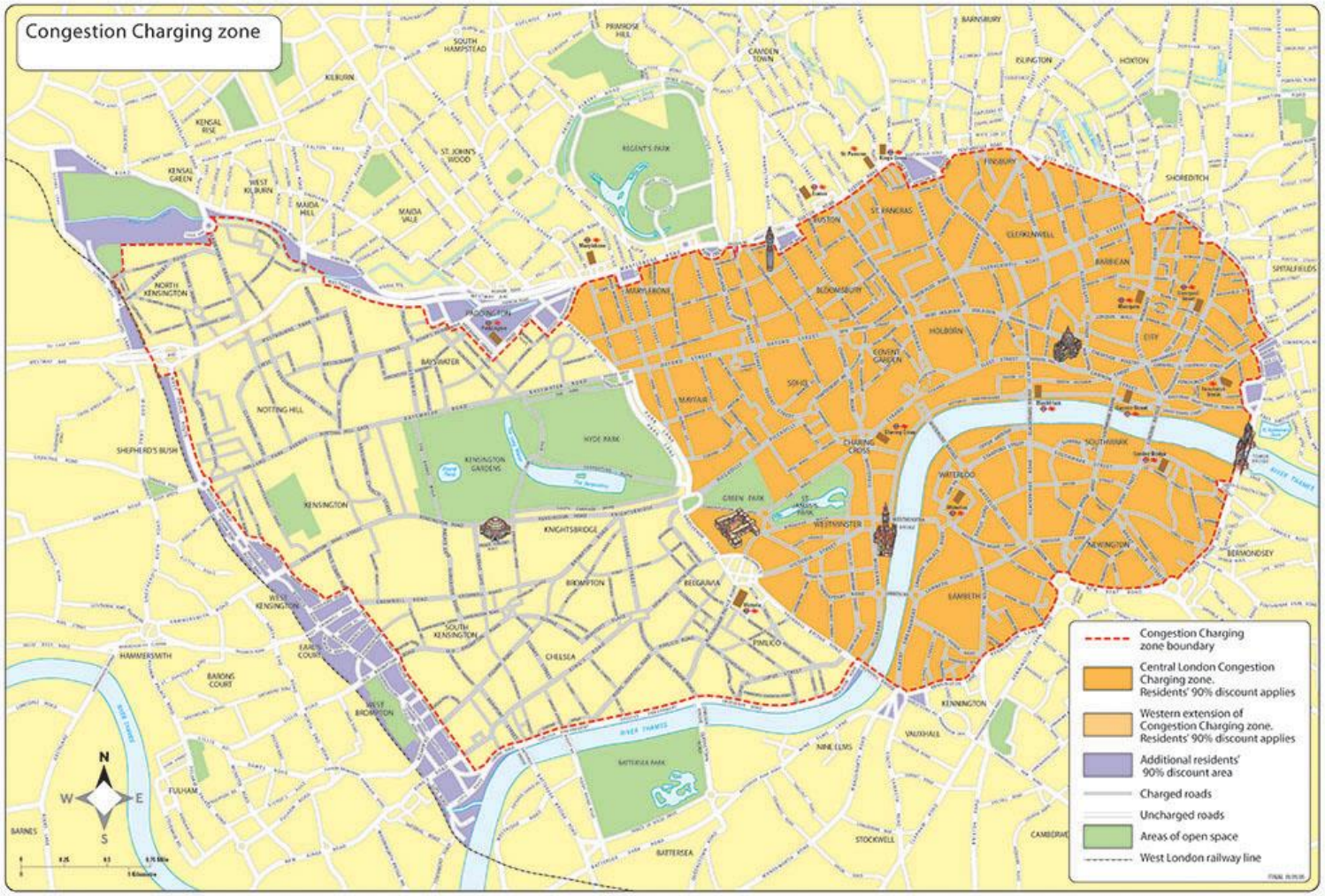
Singapore's Toll Rates Set to Achieve Performance Standards

- Review every 3-months
- Adjust up/down by hour of week and location to ensure roads are free of congestion at least 85% of time



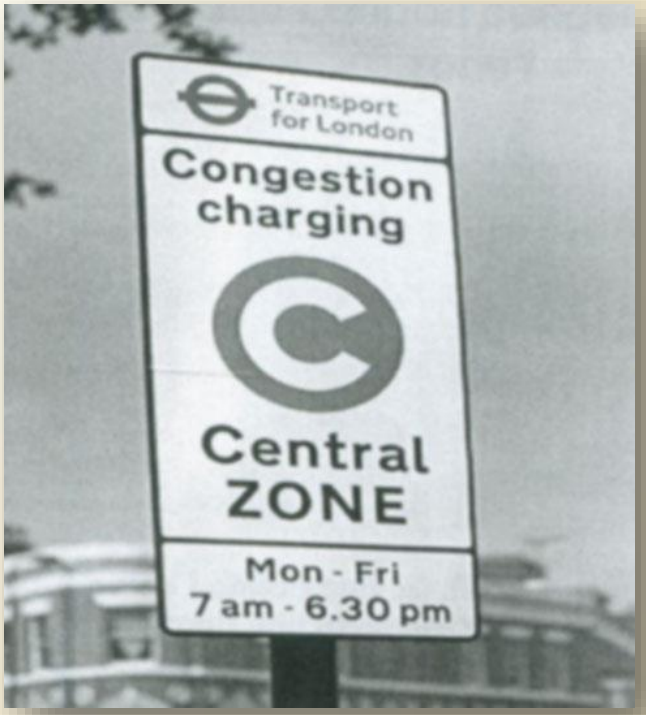
London's Congestion Charging Scheme



Project Outcomes

Traffic/Congestion

- Total traffic entering the zone down 22%
- Network speeds up from 8.5 to 10.1 mph
- Traffic delays inside the zones and in main routes entering the zone down 22% and 20%, respectively
- Congestion levels down 26%
- No significant adverse traffic impacts outside the zone



Project Outcomes - *continued*

Public Transport

- 30% transit ridership increase since 2002
- 4% modal shift to transit across London
- 6% increase in bus speeds
- 20% reduction in wait times at bus stops
- Bicycle and power two-wheelers use increased

Other Impacts

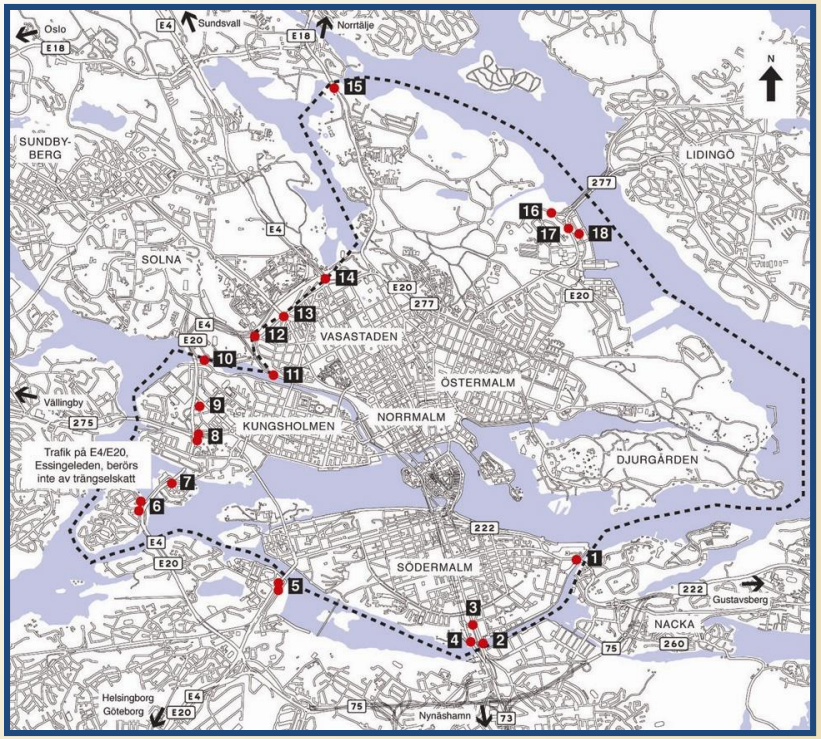
- 20% reduction in fuel consumption
- 13-15% reduction in emissions
- Reduction in vehicle crashes

Stockholm's Congestion Charging

Stockholm's Congestion Charging

Objectives

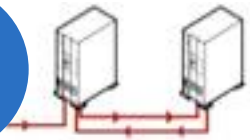
- Reduce congestion – reduce traffic volume by 10 – 15 % during rush hour
- Improve accessibility for buses and cars in the inner city
- Improve the environment
- Invest in transit



How does it work?

Call-centre operations managed by IBM

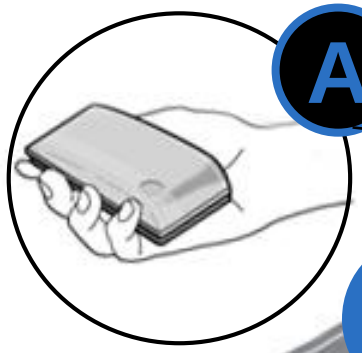
2



Information is matched with registered vehicle. Fee is added to the owner's account

The gateway registers the vehicle

IBM has designed, built, implemented integrated and runs the congestion charging system



1

Picture is taken of the vehicle's licence plate.

3

Way of payment

- Transponder/direct debit
- Bank/Giro
- 7-eleven/ Pressbyrån

Project Outcomes

- 22% reduction in traffic crossing cordon during trial period, January 1 through July 31, 2006; 20% increase to pre-trial levels after the trial ended in August.
- Travel time reliability improved and queue length dropped by one-third on approach roads during morning peak periods, and one-half during afternoon peak periods.
- Public transit use increased 6% during the congestion charge trial.
  - 4.5% attributed to the congestion charge.
  - 1.5% percent due to gasoline price and external factors

Project Outcomes - *continued*

- Public opinion changed with success of trial
  - 55% opposed before trial
  - Opposition dropped to 41% after trial began
  - Stockholm city referendum to continue congestion charge passed 53% to 45% in September 2006.
- New Swedish government reinstituted congestion charges in 2007 with changes in allocation of revenue.

China considering congestion pricing

Guangzhou Symposium in 2010

Guangzhou's BRT System

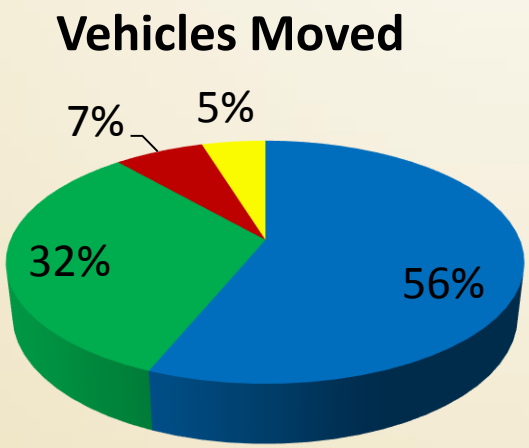
Minnesota Managed Lane Projects

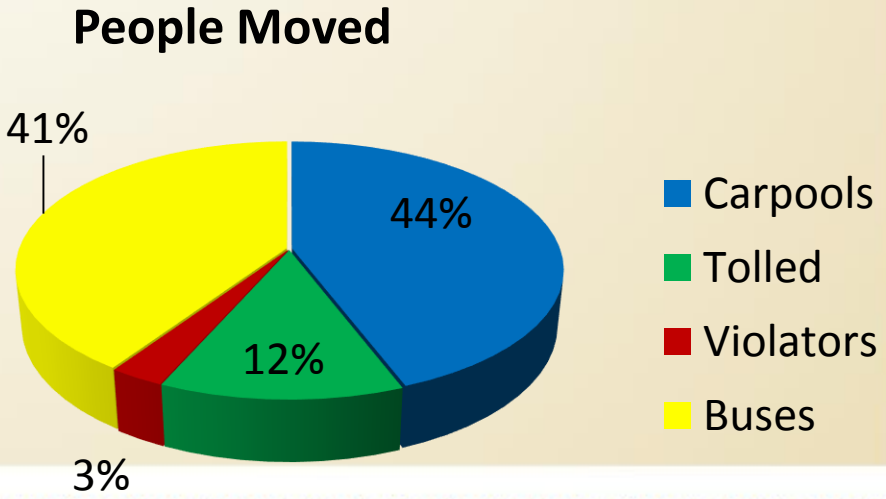
- I-394 MnPASS HOT lane project opened in 2005.
- I-35W UPA congestion relief project integrated planning and development linking MnPASS HOT lanes with transit, technology, and telecommuting improvements in 2010.
- I-35E MnPASS lanes currently under construction.

MnPASS Use & Performance

People Movement

- The majority of people using MnPASS are carpooling or riding transit
- The following charts show how single occupant MnPASS customers make up 32% of the total vehicles in the lane, but are only 12% of the total people in the lane



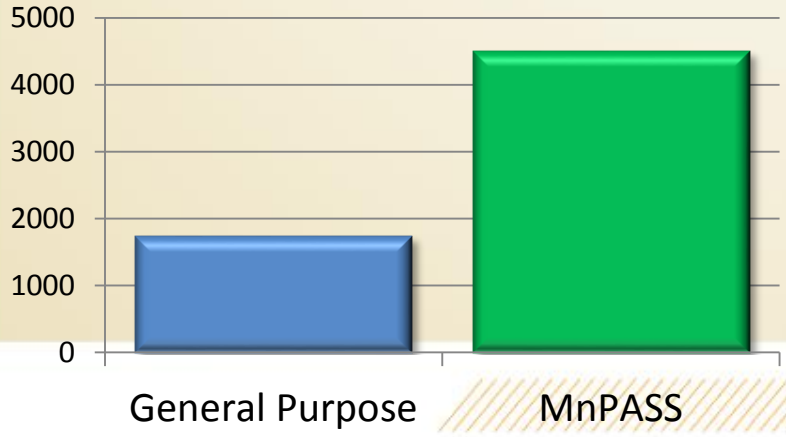


MnPASS Use & Performance

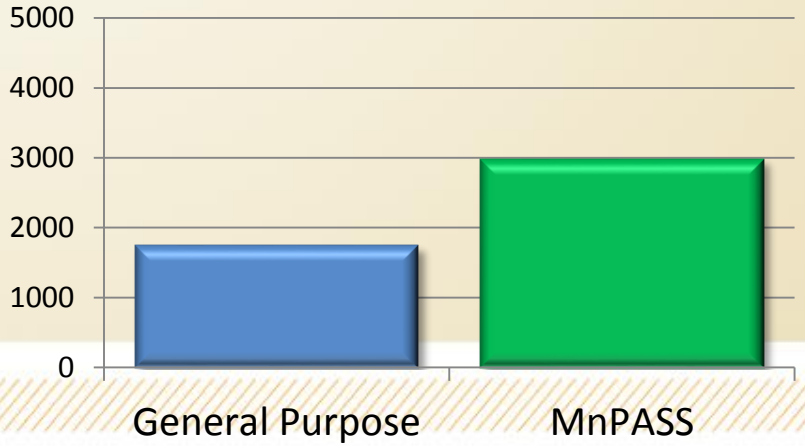
People Movement

- A MnPASS lane can move twice as many people as a single general purpose lane during congestion
- The following charts compare the number of people general purpose lanes move to the number of people MnPASS lanes move

NB I-35W at Lake Street
AM Peak Hour



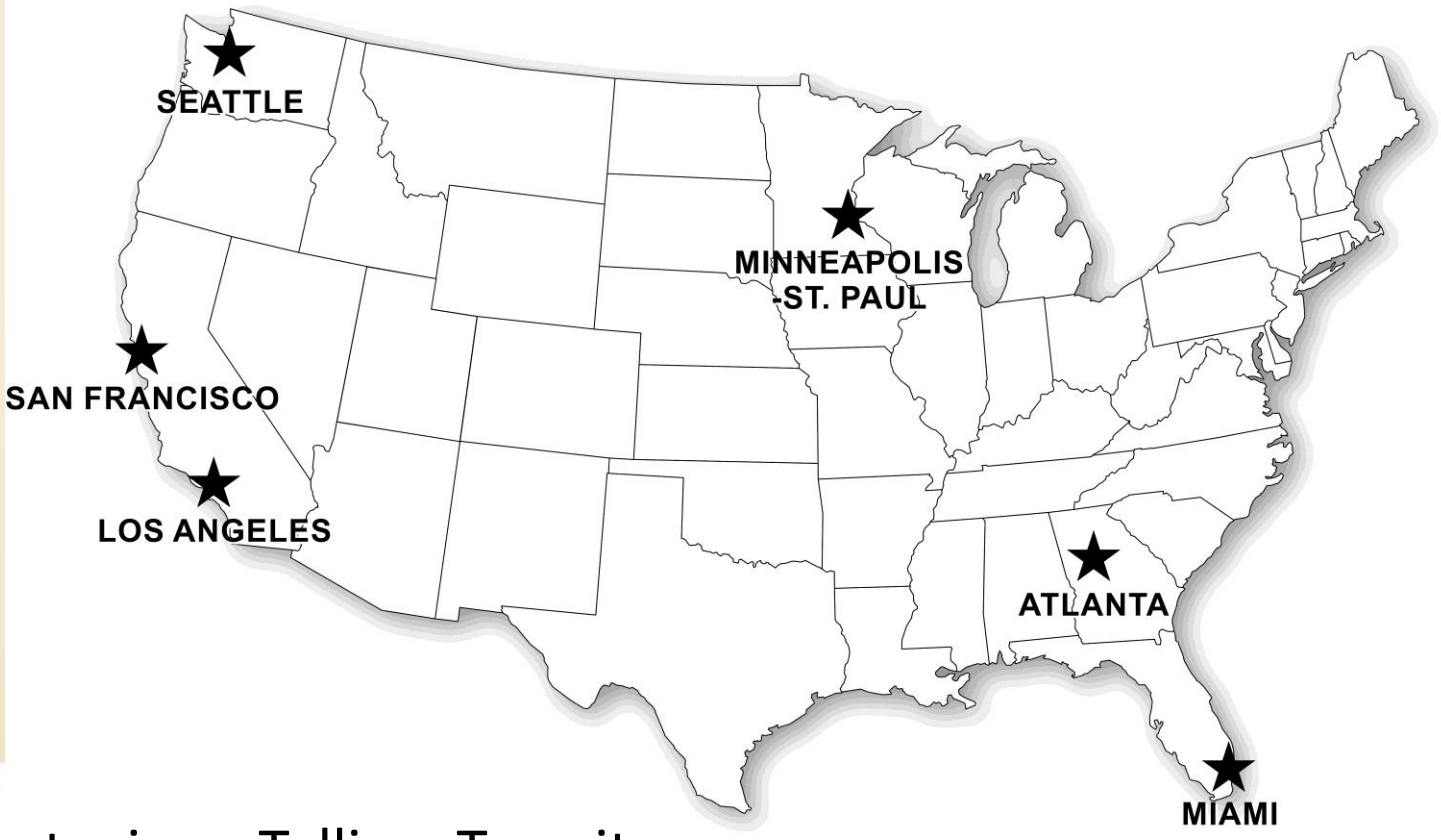
EB I-394 at Penn Ave
AM Peak Hour



Minnesota Urban Partnership Agreement (UPA)

- Minnesota UPA (2007) included 27 different projects involving transit, technology, tolling and telecommuting improvements along the I-35W corridor
- Total cost: $207 million
  - $136 million federal funds
  - $56 million state funds
  - $10 regional funds
  - $5 million local funds

UPA/CRD Partners



4 ‘T’ Strategies – Tolling, Transit, Telecommuting/TDM, Technology

I-35W MnPASS Lanes

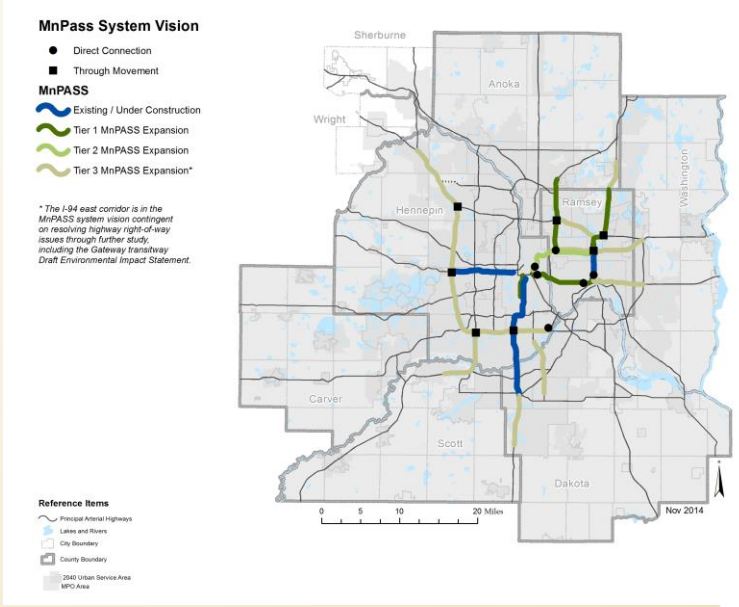
- Active I-35W MnPASS accounts increased from 7,397 in November 2011 to 11,346 in January 2015.
- Transponders associated with these accounts increased from 8,425 to 13,480 over the same time period.
- Almost 61,000 trips were made by I-35W MnPASS customers in November 2011, accounting for $94,619 in revenue.
- In January 2015, 74,542 trips were made in the I-35W MnPASS Express Lanes, accounting for $151,244 in revenue.

Source: Minnesota Department of Transportation.

I-35W MnPASS HOT Lane

Managed Lane System

- MnPASS Express Lanes are planned in other corridors by MnDOT and the Metropolitan Council, with a managed lanes system included in the Regional 2030 Transportation Policy Plan.
- MnPASS Lanes are under construction on I-35E between St. Paul and Little Canada and a future extension of these lanes north is planned.
- Other corridors that may be considered for MnPASS lanes in the future include I-35W North, I-94 between Minneapolis and St. Paul, and Highway 77/Cedar Avenue.



MARQ2 Bus Lanes

- MARQ2 lanes in downtown Minneapolis provide faster bus travel speeds, reduced travel times, and improved trip-time reliability for transit riders on express routes from throughout the metropolitan area.
- Express buses operated by Metro Transit, SouthWest Transit, Maple Grove Transit, Minnesota Valley Transit Authority (MVTA), and Plymouth Metrolink all use MARQ2 lanes.
- MARQ2 lanes accommodate 80 percent of downtown express buses from 75 park-and-ride lots throughout metropolitan area.
- Heated and lit customer waiting shelters, NexTrip real-time bus information signs, and additional trees are key to enhancing ridership.

Source: Metro Transit.

MARQ2 Lanes Downtown Minneapolis

UPA Transit Advantage Initiatives

Source: Metro Transit.

METRO Red Line

Source: Metro Transit.

Highway 77/Highway 62 Transit Advantage Bus Project

- UPA was a key catalyst in implementing **METRO Red Line**, the first BRT line in the metropolitan area. Opened in June 2013, the METRO Red Line operates along Highway 77 and Cedar Avenue from between Mall of America and Apple Valley Transit Station.
- **Bus-only left-turn lane** and traffic signals at Highway 77/Highway 62 intersection allow buses to bypass congested intersection during morning peak period.
- **Driver assist system (DAS)** for shoulder-running buses provides feedback to bus operators through "heads up" windshield display, vibrating seat, and active steering wheel .

eWorkPlace

- 50+ employers and approximately 4,200 employees participated in eWorkPlace, a state-funded telework program as part of the UPA project.
- eWorkPlace mainstreamed and institutionalized telework as a viable option in the Twin Cities metropolitan area.

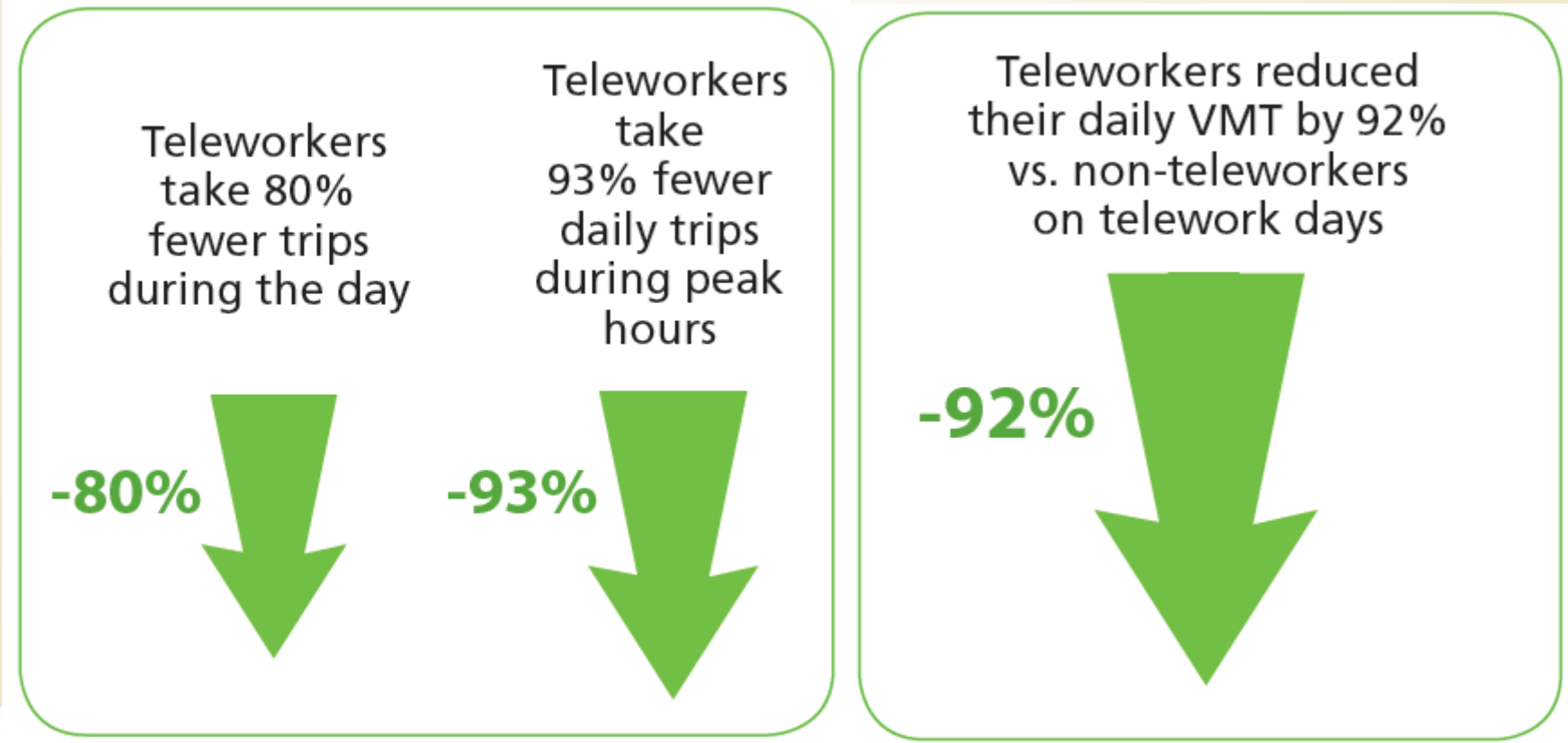
Source: H.H. Humphrey School of Public Affairs.

eWorkPlace Logo

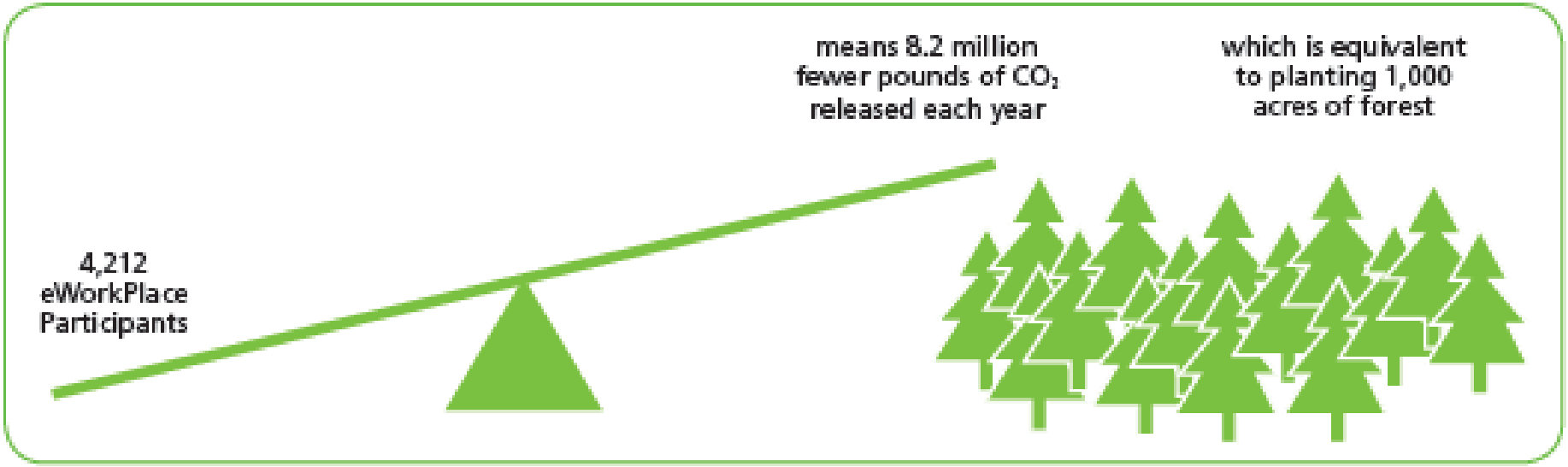
eWorkPlace Participation

- 50+ Employers
  - Non-profit (e.g. Fairview, Wilder)
  - Public (e.g. Hennepin and Carver Counties)
  - Private (e.g. Turck, Ecolab)
- 4200+ employees
  - Participants per employer range from 1 – 1,400
  - Employees participating in surveys: 1,005

Road Less Traveled



Emission Impacts



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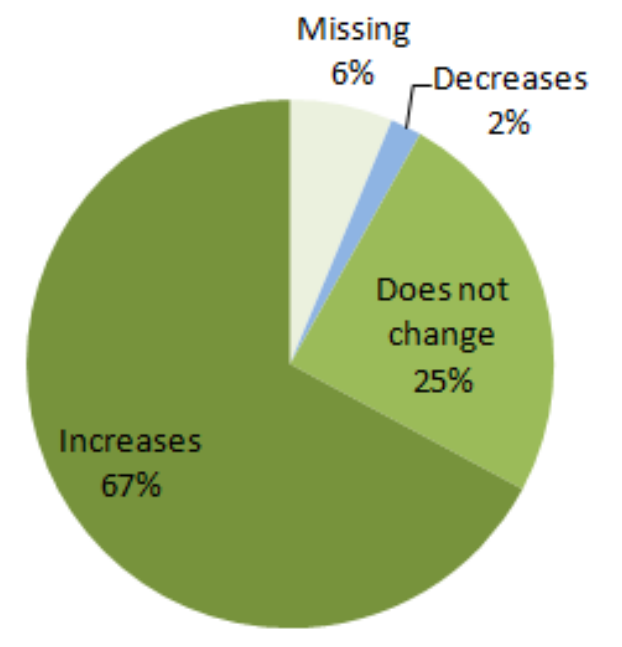
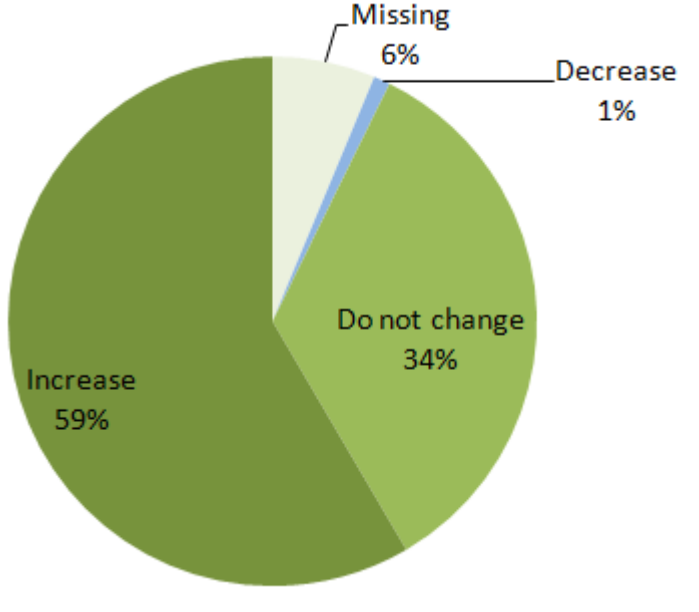
Increased Productivity



67% Employees Reported Increased Productivity



59% Employees Reported Increased Available Work Hours

Employer Survey

- **75%** felt productivity stayed the same or increased
- **95%** plan to continue or expand their telework program
- **Benefits:** Increased job satisfaction, productivity, and reduced absenteeism
- **Challenges:** More cultural than technical
- **Lessons:** Seek strong "top down" support. Start with a pilot. Use resources available

FHWA I-35W UPA Evaluation - Battelle (Jan. 2013)

- Measured a variety of congestion and mobility factors before (2009) and after (2011) the I-35W UPA improvements
- Key findings for the I-35W corridor included:
  - Peak hour travel time decreased 27% SB and 17% NB
  - Vehicle throughput increased 17%-49% depending on segment
  - Crash rates decreased by 20-25%
  - All corridor user groups benefitted from project
  - Benefit/Cost Analysis = 6.0
  - I-35W performance has continued to improve since 2011

I-35W UPA Evaluation

"The UPA was a game changer for transportation in the Minneapolis/St. Paul metropolitan area. By illustrating the benefits of multimodal approaches in congested travel corridors, the UPA projects – individually and collectively – expanded the dialog for considering applications in other parts of the metropolitan area and provided synergy for ongoing collaboration and cooperation among agencies."

- MN UPA Project Evaluation – Battelle (2013)

Conclusion

- Congestion pricing can be a powerful tool for reducing congestion as well as improving economic and energy efficiency.
- Combining pricing with other energy-efficient strategies such as transit enhancement can have an even greater impact.