Heavy Vehicle Tolling in Germany

State and Local Policy Program
Hubert Humphrey Institute for Public Affairs
University of Minnesota

Rethinking Transportation Finance Roundtable
Center for Transportation Studies
Minnesota Department of Transportation

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October 1, 2008

Why Pricing?

- Unpriced commodities lead to excessive use
- Unconstrained demand results in congestion, delays, and higher emissions
- Pricing can be used to manage system capacity more effectively
- It rations scarce highway capacity by discouraging over-use
- Can be used to promote competition among modes

German Heavy Vehicle Tolling System

Public-Private Partnership

Public

- Ministry of Transport
- Federal Office for Goods Transport (BAG)

Private-Toll Collect

- Daimler-Chrysler Financial Services
- Deutsche Telecom
- Cofiroute

German Heavy Vehicle Tolling System

Rationale

- Estimated 2 billion Euro shortfall for roads (1.5B for rail, 0.25B for waterways)
- Substantial infrastructure cost imposed by heavy trucks ($0.38 per vehicle-mile)
- 35% of truck-miles by foreign vehicles
- Non-compliance with emission standards by many foreign vehicles

German Heavy Vehicle Tolling System

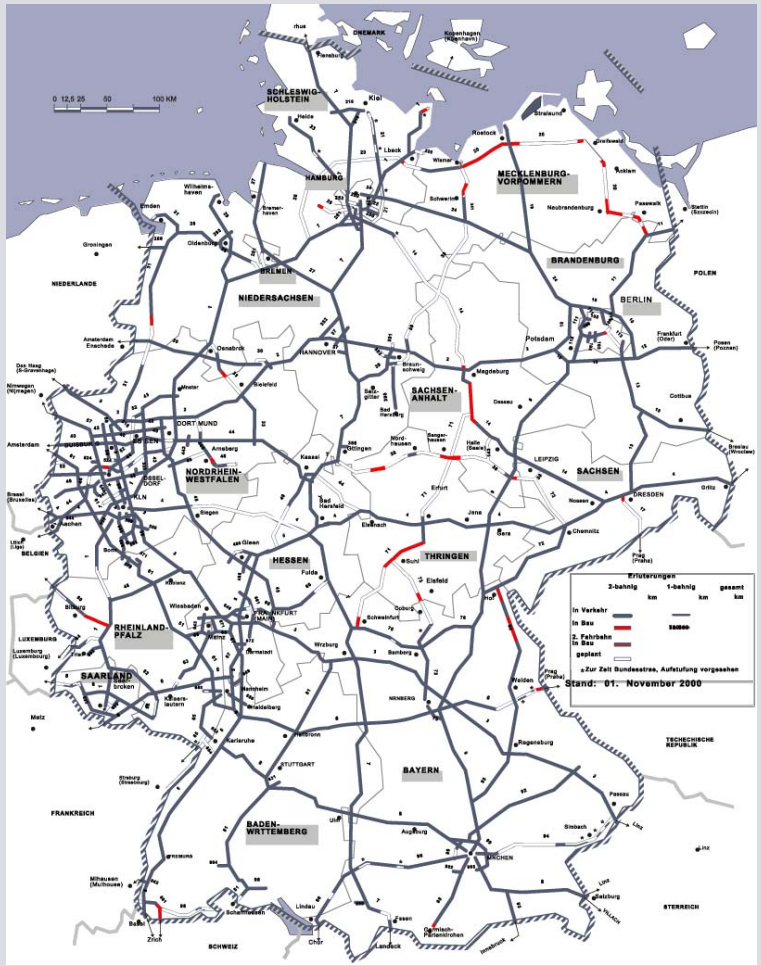
Objectives

- Introduce mileage charges applying user-pay principle
- Secure funding for upgrade/maintenance of transportation infrastructure
- Provide incentives to shift truck freight to rail and inland waterways
- Promote environmental interests and more efficient deployment of HCV
- Promote innovative tolling technology

Tolling System Description

Coverage

- Heavy trucks 12+ tons GVW (26,400 pounds)
- 7,800-mile Autobahn (Federal Motorways)
- Vehicles tolled daily: 1.5 million
- Vehicle-miles tolled: 15 billion per year



Tolling System Description

Toll Rates

- Average toll: 34 cents per mile
- Range of toll rates: 23 to 35 cents per mile
- Toll rate factors: Number of axles (up to 3 and 4+) and emission class (Euro I-Euro VI)
- Tolls per axle group: 25 to 36 cents per mile
- Tolls per emissions class: 23 to 35 cents per mile (dirtier trucks pay a 50% premium)

Tolling System Description

Annual Revenues and Cost

Revenues

- 2005: $4.5 billion
- 2006: $4.8 billion
- 2007: $5.3 billion
- Revenue distribution: 50% roads, 38% rail, 12% waterways

Cost

- 15 to 20 percent of revenues

Tolling System Description

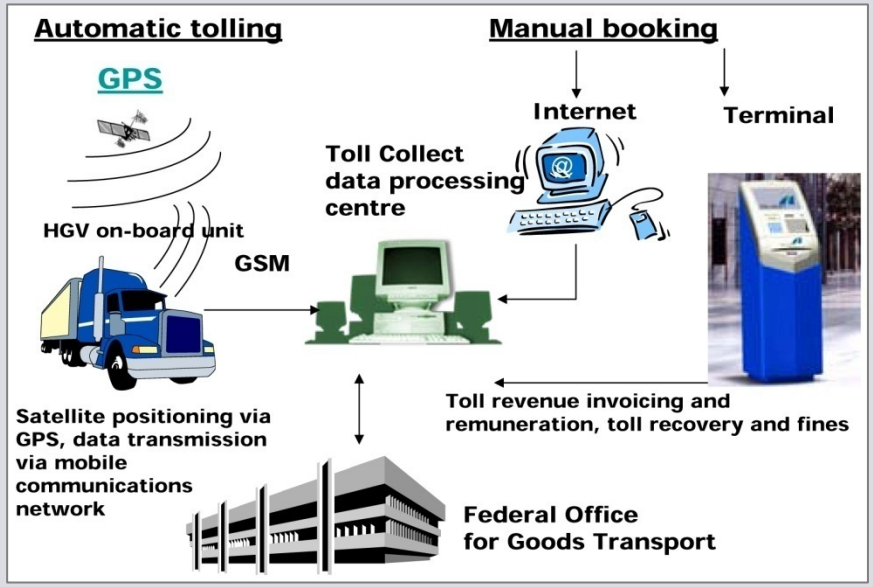
Technology

Electronic Tolling (90%)

- USGPS vehicle location
- On-board computer
- Mobile communication data transmission (GSM)
- Dedicated short-range communications (DSRC)

Manual Booking (10%)

- Internet or terminals
- Data processing center



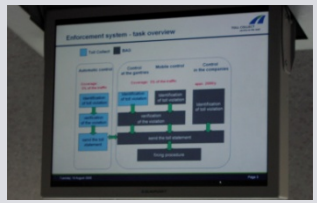
Tolling System Description

Enforcement

- Automatic, using gantries and cameras
- Stationary, at parking areas
- Mobile, using computer-equipped vans
- On shippers premises

Fines:

- Intentional $600; unintentional $300; maximum $30,000
- Responsibility: 50% to driver; 50% to shipper



Outcomes

System Performance has Met or Exceeded Expectations

- Reliability: 99.7%
- Accuracy: Negligible charge-related problems
- Flexibility: Added non-Autobahn roads and Euro VI emissions charge
- Enforceability: 1.7% violation rate
- Privacy/Security: No issues identified

Outcomes

System Has Largely Achieved Objectives:

- Successfully applied mileage-based charge on a large scale using user-pays principle
- Revenues generated exceeded prediction in 2nd year of operations
- Success in shifting freight from truck to rail uncertain
- Environment objectives achieved:
  - Dirty trucks have decreased from 50% to 36%
  - Empty truck trips have declined by 20%
- Succeeded in deploying innovative, state-of-the-art tolling technology and clean vehicle technology

Outcomes

Implementation Delays

- Initial schedule: 11 months; delayed 2 years
- Given system magnitude and complexity, unreasonable initial schedule
- Private sector underestimated technological complexity
- Claim by federal government pending

Lesson learned from German Experience

1. Clear and well-supported rationale needed to create support by affected stakeholders
2. Clear statement of objectives
   - User-pays principle
   - Earmarking revenues to transportation infrastructure
   - Cross-subsidy of rail and waterways
   - Promoting environmental interests
   - Promoting development of innovative technologies

Lesson learned from German Experience

3. Ensure adherence to principles and objectives
4. Implementation schedule must consider project magnitude and complexity, including state-of-the-art technology requirements
5. Carefully weigh the impacts on cost of system requirements
6. Address concerns about privacy and security at the outset

Conclusions

- Technology is no longer an impediment to large-scale pricing implementation
- Build support around common-good principles such as users pay, users benefit and polluters pay
- Do not allow political expediency to interfere with agreed-upon principles and objectives
- Evaluate system requirements for cost effectiveness and achieving objectives
- Measure success or failure based on performance objectives and outcomes
- Address privacy/security concerns early

Innovative Transportation Infrastructure Financing

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October 1, 2008

Innovative Transportation Infrastructure Financing

Germany's Issues With Fuel Taxes:

- Fuel taxes in Germany go directly to the general fund
- Fuel taxes have been raised 8 times since 1991
- Taxes are close to 50 percent of fuel price
- Estimated deficit: 2 billion for roads: 1.5 billion for rail; 0.25 billion for waterways

Debate:

- Need for a dedicated funding source for transportation

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Mileage-Based Tolls

- Tied to damage to roads (users pay for amount of use)
- Payers benefit (dedicated funds)
- Polluters pay (through higher tolls)
- Key objective: generate dedicated revenues for transportation infrastructure financing

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Issues for MN and the US

- The Federal Highway Trust Fund went into deficit in 2009. Congress made a temporary infusion of $8 billion to keep it solvent
- It took MN 20 years to raise the gas tax
- The federal gas tax has not been raised since 1993

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Issues with Fuel Taxes vs Revenue Generation

- Continued growth in non-petroleum-based vehicles
- Continued improvement in fuel efficiency
- Revenues are eroded by inflation: stagnant, fixed fuel taxes
- Vehicle-miles of travel have peaked and may be declining

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Fuel taxes do not provide a direct relationship between price paid and cost imposed on roads and on other drivers

•Fuel taxes don’t provide drivers with the right incentives:

- To change how often and when they use the roads
- To shift to transit
- To shift to lower-emission vehicles
- To shift to higher fuel-efficiency vehicles

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Result:

A continuous erosion of fuel tax revenues and worsening revenue projections

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Why a Mileage-Based Fee?

- It relates directly to road damage
- Not affected by alternative propulsion vehicles (but can provide incentives to shift)
- Not affected by fuel efficiency gains (but fees can be used to provide incentives)
- Sends clear signals to drivers: the more you drive, especially in peak periods, the more you pay.

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Issues with Distance-Based Tolls

- Privacy and security
- Equity
- Diversions

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Conclusion

Mileage-based fees are a more robust and sustainable revenue source than fuel taxes for transportation infrastructure financing

Policy Framework

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Policy Framework

Rationale

The future of fuel taxes as a transportation infrastructure financing mechanism is in question as can be seen by years of diminishing tax revenues going into the Federal Highway Trust Fund

Policy Framework

Is the German distance-based truck tolling model appropriate for Minnesota?

Policy Framework

Would the user-pays, user-benefits and polluter-pays principles be applicable to the Minnesota system?

Policy Framework

Germany’s shippers and carriers were able to pass on the toll payments to consumers. If this element is part of a Minnesota pricing approach, would shippers and carriers support a mileage-based charge?

Policy Framework

Should toll revenue funds be dedicated to transportation?

Policy Framework

How should revenues from distance-based tolling be used?

Policy Framework

The German system has demonstrated that differential toll rates can be used to reduce pollution levels and improve truck operation efficiency. Are these objectives desirable for Minnesota?

Policy Framework

Is advancing Minnesota's innovative technology edge a desirable objective?

Policy Framework

The State of Minnesota is in the middle of a country, just like Germany is in the middle of Europe. Can distance-based pricing be implemented in a single state?

Policy Framework

Up to this point, Germany's system does not assess time-of-day tolls. This means that they cannot use differential tolls to manage congestion. Would it make sense for a Minnesota approach to incorporate this element of demand management?

Policy Framework

What other elements should be incorporated in a MN scheme in terms of providing incentives for achieving positive changes:

- Fuel efficiency
- Alternative propulsion systems
- Emissions reduction
- Type of road
- Weight/number of axles