

ROAD PRICING

A CONFERENCE BACKGROUND PAPER



Sign marking the entrance to Stockholm's road charging zone

Prepared by
John Niles, Global Telematics
June 2008

“Our national flower is the concrete cloverleaf.”

Lewis Mumford, US architect & sociologist (1895 - 1990)

Roads and highways provide the overwhelming majority of movement that supports daily life in the USA.

About 87% of all passenger miles and 88% of total freight measured by value moves on America's roads, with airplanes, railways, and waterways carrying the rest of the load. Everybody benefits from the road network every day, directly and indirectly, a reality that underlies the argument for publicly-funded roads.

Society pays for public roads with taxes, primarily a by-the-gallon tax on gasoline and diesel fuel. That tax is now failing to keep up with the need for funding, because this tax is not indexed to keep up with cost inflation, and because consumers and shippers are buying vehicles that use less fuel per mile of vehicle travel.

Road system maintenance and improvement - including new construction, road renovations and replacements, maintenance, repairs, and operations like snow removal and incident response to keep traffic moving - desperately need a new revenue source.

Traffic Operations Needs News Tools

At the same time, the urbanized areas where most vehicle movement takes place would benefit immensely from a new traffic operations (T-Ops) management tool to push back on congestion by efficiently allocating user demand for crowded road space.

More revenue and better T-Ops would both be achieved with widespread road user fees collected by electronic detection of vehicles, and variable by time of day to be higher in congested periods, and lower off-peak. As our nation migrates to plug-in hybrid electric and other alternative fuel sources, the ultimate improvement would be a vehicle mileage and location metering system partially replacing fuel taxation. A user fee could be computed and collected on every mile driven by every vehicle.



**Drivers test
paying by mile
instead of gas
tax**



Time and Place Sensitive Road User Fees

Nearly all transportation policy analysts have reached the conclusion that widely-applied time and place sensitive road user fees are the single most effective tool available to bring about a equitable and effective improvement in the relationship between citizens and daily traffic congestion. Until recently, it was hard to imagine exactly how a wholesale change to a different means of transportation revenue collection could be done. Now, with the advent of small computers and satellite-based global positioning systems (GPS), a way forward is clear.

Toll-free roads are a relatively modern innovation in the long time-span of wheeled travel. In America, the wooden planked, most-passable improved roads prior to the Civil War of the 1860s were frequently tolled. Free, paved roads did not become prominent until the early 1900s, when society experienced the growing use of motor cars as a replacement for horse-drawn carriages and railroad trains.

Roads funded by taxation became the norm as the 20th century unfolded, culminating in the construction of the mostly toll-free Interstate Highway System 50 years ago. Still, some tolled roads, bridges, and tunnels were built throughout the 20th century. In recent years, according to US DOT, approximately 30 to 40 percent of new limited-access highways in America have been opened with tolling in place, usually geared to paying off construction bonds.

Say Goodbye to Toll Booths

The state of GPS and radio communications technology applications is already such that any highway lane can be tolled without the toll booths formerly required. In other words, information technology supports a ubiquitous vehicle mileage user fee that is shaped by the time and location that the mileage is consumed.

Taking Washington State as an example of what is possible, road travel is about 32 billion miles per year on state and interstate highways. This much travel averages out to approximately 35 miles per household per day. If there were a simple way to collect a mileage-based road user fee averaging five cents per vehicle mile, the state motor vehicle fuel tax could be completely replaced. Such a road user fee per mile traveled would be equivalent to paying for the use of water by the cubic foot, or electricity by the kilowatt-hour. A road user fee could be adjusted by vehicle weight, so that trucks that cause more wear on the pavement would pay more. The fee could also be adjusted by the amount of pollution a vehicle emits. A lower emissions vehicle should pay less per mile than an older, dirtier vehicle.

The Economics of Load Leveling

Road user fees made lower in off-peak periods would provide an incentive for travelers to avoid congestion and thus reduce congestion. Lower fees can be established by time of day, or by measuring the level of congestion in real time. Fees that change with congestion levels are the guiding principle for the recent innovation of high-occupancy toll (HOT) lanes that charge solo drivers for entering HOV lanes while keeping them free flowing via price changes.

Since some roads are more expensive than others, another fair adjustment would be to set the price depending on the cost of the road being traveled. The miles consumed traveling along a new bridge or highway should be set to cost the traveler more to contribute to paying off the construction bonds. Miles on highways built long ago should cost less. On the other hand, when replacement of a road segment lies in the near future, the price could be raised to start collecting the extraordinary level of funding needed to plan and build the renovation or replacement.

Still Much Work Lies Ahead ...

The heart-felt but often misinformed objections to date expressed by many citizens in reaction to government and private sector proposals for HOT lanes and other tolling indicates that much more work lies ahead to achieve the transition to a more usage sensitive, traffic-smoothing revenue collection system for regional transportation.

Some people can barely afford the gas they are using to drive to work, much less pay a road user fee on top. Pay-by-the-mile roadways, especially if the rate approaches a dollar per mile or higher, will put another wedge between the haves and the have nots. Programs to subsidize mobility based on ability to pay may be warranted. Some suggest using toll revenues to support public transit.

Life, Liberty, and the Pursuit of Driving

Many citizens are concerned about the possibility of electronic tracking of vehicles for road user fee collection becoming an invasion of privacy and a curtailment of liberty, especially with universal metering. This need not be the case if technical restraints are built into the implemented systems. Vehicle monitoring systems can be programmed to only report out the fees due to the billing agencies. They can be designed so that the vehicle owner can request an audit trail with details of trips, but this information is otherwise privileged. Government agencies are showing a great deal of interest in collecting tracking information, so new laws may be needed to ensure that system designs are limited to anonymous revenue collection.

There are many reasons why ubiquitous road user fees will be difficult to implement, but the Pacific NW region and Western Canada are already stepping up to the challenge. The Tacoma Narrows Bridge project has been set up with an electronic tolling system that will be used in further rounds of tolling, such as the SR-167 HOT lane project south of Seattle. The financing plans for the SR 520 bridge in Seattle, a new Columbia River crossing for I-5 between Washington State and Oregon, and the Golden Ears Bridge across the Fraser River in the Vancouver, BC region have tolling established as a key component of the funding plans. The Puget Sound Regional Council vehicle metering pilot called "Traffic Choices" is providing valuable data on how consumers respond to different price levels on different roads at different times of day. Oregon DOT's experiment in mileage metering combined with gasoline tax rebates shows a path of transition.

All of these efforts build on the recommendations of planners that road pricing become a part of our transportation future.

About the Author

John S. Niles is owner and president of [Global Telematics](#), a policy research and management-consulting firm based in Seattle and a senior fellow at Discovery Institute. He works with innovators from business and government on regional telecommunications strategy, public transportation revitalization, and economic development planning.

His work in transportation focuses on developing, explaining, and implementing readily available analytical techniques that seek the highest productivity investments, including those that exploit foreseeable technology-based service innovation such as Bus Rapid Transit. He has conducted research and development on instant carpooling, the effect of new urban light rail stations on transit market share, travel value pricing, and measurement of local-delivery trucking impacts on congestion. Since the late 1980s he has informally staffed Seattle-area political leaders who seek cost-effective mass transit investment