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Memorandum Date: May 28, 2009  
Meeting Date: June 23, 2009

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**TO:** Board of County Commissioners  
**DEPARTMENT:** Public Works  
**PRESENTED BY:** Celia Barry, Transportation Planning  
**AGENDA ITEM TITLE:** Oregon Department of Transportation Presentation on Tolling and Pricing Policy Development White Papers

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**I. MOTION**

Information only.

**II. AGENDA ITEM SUMMARY**

ODOT's Long Range Planning Unit Manager, Robert Maestre, will present information on seven white papers that ODOT recently completed. A memo on the same topic prepared for the Metropolitan Policy Committee's May 14<sup>th</sup> meeting is attached.

**III. BACKGROUND/IMPLICATIONS OF ACTION**

**A. Board Action and Other History**

Not applicable.

**B. Policy Issues**

No action is requested at this time, so there are no policy implications that must be considered.

**C. Board Goals**

No action is requested at this time, so there are no Board Goal implications that must be considered.

**D. Financial and/or Resource Considerations**

No action is requested so there are no county financial or resource considerations.

**E. Analysis**

Not applicable.

**f. Alternatives/Options**

Not applicable.

**V. TIMING/IMPLEMENTATION**

No alternative actions are requested.

**VI. RECOMMENDATION**

Staff is making no recommendation on the informational report.

**VII. FOLLOW-UP**

Not applicable.

**VII. ATTACHMENTS**

“Tolling and Pricing Policy Development White Papers”, May 4, 2009 Memorandum to Metropolitan Policy Committee and Attachments, Highlights of White Papers #1 - #7

May 4, 2009

To: Metropolitan Policy Committee  
From: Savannah Crawford, ODOT Area 5 Planner  
Subject: Item 5.f: Tolling and Pricing Policy Development White Papers

**Action Recommended:** Discuss and provide feedback to ODOT staff.

### **Background**

Advances in electronic technology enable the tolling of highways to be done in a variety of ways and for a variety of public policy objectives. To date, tolling in Oregon has been limited to a few Columbia River bridges. In response to new opportunities for tolling, the Oregon Transportation Commission (OTC) established several strategies in the 2006 *Oregon Transportation Plan* for examining the applicability of tolling in Oregon.

As part of this effort, the OTC commissioned a series of White Papers to explore a variety of policy and methodological issues unique to tolling or congestion pricing. These White Papers are intended to provide discussions of particular issues that are accessible to both policy-makers and the general public. Because of the relative unfamiliarity with tolling and pricing, coupled with the immediacy of our current transportation challenges, discussions about putting tolling and pricing policies in place can be confusing to the public. Because public attitudes and acceptance of tolling are also evolving, ODOT policy development needs to be sensitive to the potential effects of tolling on public attitudes. The white papers are intended as a mechanism for soliciting public comment and not as statements of OTC policy.

### **Discussion**

Seven White Papers were completed. Full documents, highlights, and comment forms can be found at [http://www.oregon.gov/ODOT/TD/TP/Tolling\\_Background.shtml](http://www.oregon.gov/ODOT/TD/TP/Tolling_Background.shtml). Paper topics and summaries follow:

#### *White Paper #1 – Air Quality/Greenhouse Gas Emissions*

In order to improve air quality or to reduce greenhouse emissions, tolling/pricing must induce changes in the use of motor vehicles, such as fewer “cold starts,” reductions in vehicle miles traveled (VMT), or decreases in vehicles hours of delay (VHD). The white paper discusses the relative efficiency of various tolling applications as a strategy for reducing greenhouse gas emissions.

### White Paper #2 – Geographic & Situational Limits

Highway tolling or pricing may have limited applicability in parts of Oregon. Much of the state is rural and possesses highways with neither the traffic volume nor levels of congestion typically required for successful tolling/pricing applications. Further, Oregon has little experience with tolling, a fact reflected in the relative lack of consideration of the topic seen to date in transportation planning throughout the state.

It is ODOT's desire that the planning process be better equipped to consider tolling/pricing applications, when appropriate, while being relieved of the need to consider tolling in circumstances with little or no chance for success. Additionally, the relatively low traffic volume on many state highways implies that most potential toll projects are unlikely to be financially self-sustaining. The resulting requirement for state or local financial contributions raises, in turn, a series of finance and project programming issues.

### White Paper #3 – Demand Projection Sufficiency

Technological enhancements enable highways to be tolled or variable-priced in a number of ways. The evaluation of tolling applications is dependent upon accurate projections of resultant travel behavior that predict not only facility usage but also the level of expected toll receipts, the amount of traffic diversion around the tolled facility, and changes in relative levels of accessibility to different locales in the area served.

This white paper assesses current modeling practices in Oregon. It explains how new methods of travel demand modeling address the analytic requirements of tolling and dynamic pricing, evaluates the effectiveness of existing models across a range of tolling applications and offers a set of general recommendations for improving model performance.

### White Paper #4 – Economic Evaluation of Improved Reliability

A major benefit of some highway pricing applications is improved reliability for motorists. The application of variable prices, dynamically in certain cases, can reduce traffic volumes sufficiently to ensure free flow conditions and to guarantee the motorist a "time certain" trip over the affected roadway. Beyond the travel time savings a tolled facility provides, the guarantee of reliability can be expected to have an economic value in and of itself. This is a new consideration in transportation planning. The paper discusses the challenges to quantifying the economic benefits of improved reliability.

### White Paper #5 – Assessing the Economic Effects of Congestion Pricing

Congestion pricing is being considered in some locales for entire parts of an urban area. Pricing schemes cannot be expected to affect all motorists or locales evenly; there will be winners and losers and a unique set of economic consequences for each potential application.

Given the indeterminate nature of broad congestion pricing schemes coupled with expected analytical challenges, it may be necessary to develop one or more methodologies for determining expected economic outcomes. This white paper is intended as a first step in this process, and provides a general discussion of the potential economic

effects of system-wide congestion pricing that frames the problem in terms of its theoretical, analytical, and institutional parameters.

**White Paper #6 – Economic Comparison of Alternatives**

Since most potential tolling are new to Oregon, attention may need to be paid to the analytical methods for assessing the relative economic efficiency of tolled and non tolled highway improvement alternatives.

Tolling presents some unique challenges to traditional methods for evaluating alternate transportation improvements, such as benefit/cost analysis or cost effectiveness comparisons. Constant value-of-time assumptions have been challenged by observed motorist behavior in toll managed lanes. There is also the need to consider the “consumer surplus” a motorist enjoys in a tolled lane rather than simply straight time savings. Freight movements demonstrate variable elasticity to tolls, which could alter analytical conclusions.

The analytical challenges and lack of public familiarity with some of these issues suggests the need for increased analytical rigor and transparency for potential tolling projects. This white paper is intended as an initial consideration of how this can best be done.

**White Paper #7 – Truck Only Toll Lanes**

There has been a recent surge in national interest in truck only toll lanes (TOT lanes), and a variety of proposals are in some stage of consideration. In varying degrees this reflects the growing economic cost of congestion, lagging investment in highway capacity, and a desire by some to privatize portions of the highway system. This growth in national interest implies a need for ODOT to consider the utility of TOT lanes before embarking on future freeway corridor studies. This white paper provides an introduction to the subject intended for enhancing state policies and the transportation planning process.

**Attachments**

1. Tolling Paper #1 Highlights: Air Quality/Greenhouse Gas Emissions
2. Tolling Paper #2 Highlights: Geographic & Situational Limits
3. Tolling Paper #3 Highlights: Demand Projection Sufficiency
4. Tolling Paper #4 Highlights: Economic Evaluation of Improved Reliability
5. Tolling Paper #5 Highlights: Assessing the Economic Effects of Congestion Pricing
6. Tolling Paper #6 Highlights: Economic Comparison of Alternatives
7. Tolling Paper #7 Highlights: Truck Only Toll Lanes



# Greenhouse Gas Emission Impacts of Tolling and Pricing Strategies

Highlights of Tolling White Paper 1



March 2009

## Introduction

Climate change, which results from the release of various greenhouse gases into the atmosphere, is a growing concern locally, nationally and globally because of the changes that can result to sea levels, forests, farms and agriculture, and human and natural environments.

The transportation sector in general, and motor vehicles in particular, are large contributors of greenhouse gas emissions. Reducing these emissions is a key strategy to slowing and reversing the amount of greenhouse gases released into our atmosphere.

With advances in technology that eliminate toll booths and keep traffic moving, objectives of highway pricing/tolling have expanded beyond the traditional purpose of revenue collection to areas such as congestion management or economic sustainability. This paper considers whether reducing greenhouse gas emissions is an appropriate policy objective for tolling. Said differently, it asks if reducing greenhouse gas emissions should be the primary motivation for tolling highways in Oregon.

## Greenhouse gas emissions and transportation

Oregon state law says the growth of greenhouse gas emissions should be arrested by 2010, reduced to 10% below 1990 levels by 2020 and reduced to 75% below 1990 levels by 2050.

In Oregon, the major sources of greenhouse gas emissions are the transportation and electric utility sectors, at 34 and 32 percent of total greenhouse gas emissions respectively. Within the transportation sector, motor vehicles comprise 81 percent of total energy consumed,

Seven technical tolling and pricing white papers were prepared for ODOT in February 2009 as a way to consider concerns and issues for Oregon to address prior to developing a tolling/pricing policy in the future.

1. Is tolling an effective means of reducing greenhouse gas emissions?
2. Where, geographically, could tolling work and under what circumstances?
3. Forecasting change – how do we incorporate tolling and pricing into our regional transportation models?
4. What are the economics of transportation system reliability?
5. How should the economic and social effects of broad applications of congestion pricing be assessed?
6. How do you determine if tolling a project is a better alternative than other non-tolled options and how would you choose between a number of tolled alternatives?
7. Are truck-only toll lanes a viable option for Oregon?

This document highlights White Paper 1 about tolling and greenhouse gas emissions. Find all papers online and provide your comments: [www.oregon.gov/ODOT/TD/TP/Tolling\\_Background.shtml](http://www.oregon.gov/ODOT/TD/TP/Tolling_Background.shtml)

and carbon dioxide (CO<sub>2</sub>), is the biggest contributor to greenhouse gas emissions. It is emitted in direct proportion to fuel consumption, with variation by fuel type, vehicle type, model year, and operating conditions (speed and acceleration).

Reducing motor vehicle emissions is a key strategy in the battle against climate change.

### Conclusions

White Paper 1 reviewed a variety of methods to reduce transportation-related emissions. Most can be classified into the following categories:

- Reduce vehicle emissions – the stuff coming out of the tail pipe
- Improve fuel economy standards
- Change fuel type or composition to reduce carbon
- Manage congestion
- Improve transportation/highway system operations to keep traffic moving in a fuel efficient manner

The paper came to the following conclusions:

- Improving fuel economy standards and emission controls are more likely to result in major decreases in greenhouse gas emissions than changing the manner in which road usage is priced.
- To affect motorist behavior enough to reduce vehicle miles traveled, rates would be higher than current carbon tax proposals. Roadway pricing at these levels, therefore, should be based on objectives more comprehensive than reducing greenhouse gas emissions.

- Road pricing can be designed so that the greenhouse gas reduction impacts are heading in the right direction. For example, results from high occupancy toll or express toll lanes in other areas of the country show that fuel savings range between 1 and 2.5 percent when tolling a region or system.
- Achieving larger emission reductions would require an aggressive and comprehensive pricing program broader in scope than is typically associated with tolling and congestion-based road pricing.
- Road pricing by itself is not sufficient to achieve the desired reduction in transportation sector greenhouse gas emissions targeted in Oregon's climate change action plan. Additionally, broad application of congestion pricing may result in an array of economic, land use, and other impacts that should be considered.

### For More Information

- Visit the Web site to read the white papers and complete a comment form:  
[www.oregon.gov/ODOT/TD/TP/Tolling\\_Background.shtml](http://www.oregon.gov/ODOT/TD/TP/Tolling_Background.shtml)
- Email: [Robert.A.Maestre@odot.state.or.us](mailto:Robert.A.Maestre@odot.state.or.us)



# Geographic and Situational Limits of Tolling

Highlights of Tolling White Paper 2



March 2009

## Introduction

Tolling and roadway pricing can be used to achieve different objectives. Revenue generation to pay for projects is the traditional use of tolling and has been used in the past in Oregon for several of the Columbia River bridges. New technologies that eliminate toll booths and keep traffic moving are making congestion management an additional and achievable goal through roadway pricing.

Determining the potential effectiveness of projects and applications to achieve these goals is the purpose of White Paper 2, which addresses two specific questions.

- 1) Under what circumstances could pricing and tolling be applied successfully in Oregon? (or, as phrased in the white paper, are there geographic or situational limits which should guide tolling policy?); and
- 2) How can we effectively plan a project if toll revenues are not adequate to pay for it? (This is a likely situation, given Oregon's sparse population in many areas of the state.)

As background, the paper discusses key management issues that should be considered as part of a project proposal, including who owns, operates and finances a tolled facility. It summarizes current regulations and identifies new legislation that would clarify and allow for emerging issues and technologies.

Most of the paper, however, is spent identifying the type of tolling/pricing projects and the situations or characteristics under which those can be successful in achieving either adequate revenue generation to fund a project or in managing traffic.

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6. How do you determine if tolling a project is a better alternative than other non-tolled options and how would you choose between a number of tolled alternatives?
7. Are truck-only toll lanes a viable option for Oregon?

This document highlights White Paper 2 – where and under what circumstances could tolling work in Oregon. Find all papers online and provide your comments: [www.oregon.gov/ODOT/TD/TP/Tolling\\_Background.shtml](http://www.oregon.gov/ODOT/TD/TP/Tolling_Background.shtml)

**Situations/conditions for potential toll projects:**

- Applying tolls on existing facilities to fund new capacity
- Adding a new tolled lane or lanes to a highly congested corridor to manage demand and/or raise revenues to pay for the new capacity
- Constructing a toll by-pass route if traffic volumes are moderate to high
- Building a new access road to an airport, port or other significant trip generator

**Conclusions**

There are circumstances where tolling should not be considered in Oregon, such as:

- Daily traffic volumes are less than 20,000 vehicles
- There are less than three miles to a free route to which motorists could easily divert
- There is little or no congestion relief on adjacent or parallel routes

Even in cases where there could be sufficient volumes to raise revenue, most projects would not raise enough from tolling alone. This raises questions about how ODOT should treat partially toll-funded projects in the State Transportation Improvement Plan (STIP). The STIP includes projects having full funding and a high likelihood of being constructed. Including expensive, partially funded projects in the STIP – given current and likely future funding limitations – challenges traditional practices and would raise questions about local government assertions of secure sources of other funds.

There are circumstances where tolling can be considered in Oregon. These include:

- Daily traffic volumes exceed 60,000 vehicles
- Substantial travel time savings are achieved
- Parallel facilities don't become overly congested
- Free alternative routes are not within a reasonable distance of the tolled facility (not within three miles)
- Transit is exempt from paying tolls
- Tolls are used to expand transit service during peak periods to encourage ridership and provide an alternative to paying the toll
- There is public acceptance for the project with local champions to help support it

**For More Information**

- Visit the Web site to read the white papers and complete a comment form:  
[www.oregon.gov/ODOT/TD/TP/Tolling\\_Background.shtml](http://www.oregon.gov/ODOT/TD/TP/Tolling_Background.shtml)
- Email: [Robert.A.Maestre@odot.state.or.us](mailto:Robert.A.Maestre@odot.state.or.us)

# Tolling and Travel Demand Model Sufficiency

Highlights of Tolling White Paper 3



March 2009

## Travel models

State, regional and local transportation planners rely on travel models to evaluate future traffic patterns. Models allow planners to see how people will behave if changes are made to the transportation system.

Existing models in Oregon are rated as excellent for the purposes they were designed, and some are internationally recognized. However, Oregon models have not been specifically designed to evaluate toll projects, so planners are not able to confidently forecast travel patterns for projects that are considering tolling/pricing. Existing models are not able to determine how travelers would change their mode, route, travel time, or destination in response to tolling/pricing.

## Tolling, reliability and travel choices

Measuring and understanding how highway users value and respond to travel time savings and changes in reliability are key to updating travel demand models. (This issue is explored in more detail in White Paper 4.) Although there is general agreement that it's important to measure the value of reliability, the best way to quantify reliability is not known at this time. A handful of approaches have been identified through practice or research, though each has some short-comings in application. What is understood is that there are first and second-level choices that people make in response to the option of a tolled facility.

First order choices are immediate responses. These include whether to take the tolled route or the free route, whether transit is a better option, and what time to travel. The tolled route might be more reliable, but it has a fee. Traveling during rush hour might involve a higher toll than other hours.

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4. What are the economics of transportation system reliability?
5. How should the economic and social effects of broad applications of congestion pricing be assessed?
6. How do you determine if tolling a project is a better alternative than other non-tolled options and how would you choose between a number of tolled alternatives?
7. Are truck-only toll lanes a viable option for Oregon?

This document highlights White Paper 3 about the sufficiency of travel demand models to accommodate tolling. Find all papers online and provide your comments: [www.oregon.gov/ODOT/TD/TP/Tolling\\_Background.shtml](http://www.oregon.gov/ODOT/TD/TP/Tolling_Background.shtml)

Second order responses depend on the tolling application. These responses could include deciding to change the trip destination, cancel the trip, or combine the trip with other purposes (in order to reduce the

cumulative effect of paying a toll for every trip). Second order choices are more difficult to measure and require more “feedback loops” in the model.

These responses are important in order to understand the effects tolling will have on traffic, but are also needed to meet certain thresholds regarding revenue estimates if a project is to be financed with bonds and paid back by toll revenues. Investors will need confidence that the model is accurate in order to provide the funds. The quality of the travel demand model is one consideration in assigning bond ratings.

## Conclusions

White Paper 3 reviews characteristics of travel models in several of Oregon’s major cities/geographic regions and assesses their current capabilities compared to the types of data most likely needed to estimate travel behaviors in a tolled environment. Although the models meet state-of-the-practice standards they were not developed to evaluate tolling applications.

White paper 3 recommends improvements to the existing models so that they can account for tolling:

- Improve the models to better account for first and second order responses to tolling/pricing conditions.
- Improve the ability to group motorists into categories based upon their value of travel time reliability. This would increase confidence in model results.
- Confirm that the model accurately estimates traffic and transit at the corridor level before evaluating tolling/pricing projects.

- Implement a data collection program to encourage model improvements across the state.
- Implement a process that would identify and systematically analyze risk factors. This would produce conservative estimates that planners and decision makers could rely on.

## For More Information

- Visit the Web site to read the white papers and complete a comment form:  
[www.oregon.gov/ODOT/TD/TP/Tolling\\_Background.shtml](http://www.oregon.gov/ODOT/TD/TP/Tolling_Background.shtml)
- Email: [Robert.A.Maestre@odot.state.or.us](mailto:Robert.A.Maestre@odot.state.or.us)

# Economic Evaluation of Improved Reliability

Highlights of Tolling White Paper 4



March 2009

## Background

One irony of our transportation system, particularly the highway network, is that it is most unreliable when it is most needed. Peak commute times are the busiest, and because demand (the number of vehicles on the road) is higher than the supply (the amount of lane space available) the road becomes congested, the trip takes longer and is less reliable. This means that trip duration may vary from day to day. The lack of a dependable travel time is one problem that congestion pricing seeks to solve.

## Defining and measuring travel time reliability

Defining and measuring reliability and determining its economic value is the subject of White Paper 4. As illustrated in the anecdotes on the next page, different types of highway users will value the economics of travel time reliability in different ways. As part of determining the benefits of a potential project, reliability would have to be defined and then assessed.

## Congestion pricing

Congestion pricing is an overarching term used to describe measures that reduce congestion by charging drivers tolls that vary by time of day or traffic volumes. One of the primary benefits of congestion pricing is that it can re-introduce reliability to our highways by charging people higher prices when demand is highest. Pricing encourages people to take another route, take transit or carpool, travel at a different time of day, or change their destination. This reduces the number of vehicles, making travel times more reliable for those using the tolled facility. Improving reliability reduces the variability and uncertainty of travel. We know that this has an economic value.

Seven technical tolling and pricing white papers were prepared for ODOT in February 2009 as a way to consider concerns and issues for Oregon to address prior to developing a tolling/pricing policy in the future.

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7. Are truck-only toll lanes a viable option for Oregon?

This document highlights the White Paper 4 on the economics of travel time reliability. Find all papers online and provide your comments: [www.oregon.gov/ODOT/TD/TP/Tolling\\_Background.shtml](http://www.oregon.gov/ODOT/TD/TP/Tolling_Background.shtml)

Consider the following anecdotal statements:

*"Usually a trip to the airport takes 20 minutes but this time it took 45. I tried to allow enough buffer time but congestion is so unpredictable."*

*"I have to pick up my child at daycare, or it will cost me a dollar for every minute I'm late. I'd gladly pay a few bucks to know that my trip will always take the same amount of time. This helps me plan my workday better"*

*"We rely on just-in-time delivery to keep our warehousing costs down. . ."*

### **Personal and commercial highway users**

Past research and experience across the county provides good information on the personal value of travel time reliability. We also have a handle on the commercial costs of congestion, but not on the economic consequences of changing the reliability of highway systems. Each sector and segment of the commercial economy has very different ways of responding to and managing their transportation costs. This is because the total transportation cost of production varies greatly, depending on how each industry organizes its logistics support and production processes.

Not only do we need to consider the personal and commercial economic value of reliability, we have to consider the extent and type of pricing application being considered, and what direct and indirect effects will result.

### **Direct and indirect effects depend upon the type of toll proposed**

For example, the effects of initiating a time-of-day charge on one lane of a multi-lane highway will be easier to assess than doing the same thing on all major highways and arterials in a region, or installing a pricing cordon in a downtown core, where people pay to enter a typically high-traffic area. The users of the highway will be directly affected by the charge.

An indirect effect is what happens elsewhere in the system. Drivers may give up certain types of activities altogether or businesses may have to compensate for additional "last mile" congestion or decreased reliability. So, if all the highways and major arterials in a region are tolled, it becomes more difficult to understand people's choices and their economic effects across the system. In other words, the wider the pricing net is, the more complex it is to evaluate.

### **Conclusions**

These are emerging issues across the country as more places investigate the value of congestion pricing. If Oregon should pursue congestion pricing, more work will need to be done to understand the economic effects in general, how they vary across commercial sectors in particular, and how those effects will differ depending upon the type of project being proposed.

Because this is a complex issue, Oregon may want to consider developing a uniform procedure to vet methodological approaches and/or to evaluate pricing proposals in the future.

### **For More Information**

- Visit the Web site to read the white papers and complete a comment form:  
[www.oregon.gov/ODOT/TD/TP/Tolling\\_Background.shtml](http://www.oregon.gov/ODOT/TD/TP/Tolling_Background.shtml)
- Email: [Robert.A.Maestre@odot.state.or.us](mailto:Robert.A.Maestre@odot.state.or.us)

# Assessing the Economic Effects of Congestion Pricing

Highlights of Tolling White Paper 5



March 2009

**Congestion pricing** is an overarching term used to describe measures that reduce congestion by charging drivers tolls that vary by time of day or traffic volumes. The intent is to improve the economic efficiency of the highway system by more correctly pricing the use of congested highways. Advances in technology have made it possible to keep traffic moving by eliminating toll booths and using 100 percent electronic toll collection systems.

## Congestion pricing issues

The primary purpose of the congestion pricing white paper is to emphasize that there are benefits and costs to congestion pricing. This, in turn, raises a number of analytical challenges in evaluating the economic and social effects resulting from the introduction of congestion pricing to an urban highway system. The paper discusses tools needed to evaluate a successful proposal to better understand if the project is worthwhile. The paper also briefly addresses additional issues such as equity, environmental justice, privacy and administrative costs. It summarizes recent findings<sup>1</sup> about public acceptance of pricing programs, noting that the public:

- Wants value; that is, they want to see a benefit for the price that they pay
- Learns from experience; as tolling and pricing options are actually implemented, the fear of the unknown recedes and approval increases
- Cares about the use of revenues and wants tangible projects
- Believes in equity and wants fairness
- Wants simplicity and prefers tolls to taxes

Seven technical tolling and pricing white papers were prepared for ODOT in February 2009 as a way to consider concerns and issues for Oregon to address prior to developing a tolling/pricing policy in the future.

1. Is tolling an effective means of reducing greenhouse gas emissions?
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This document highlights White Paper 5 about congestion pricing. Find all papers online and provide your comments: [www.oregon.gov/ODOT/TD/TP/Tolling\\_Background.shtml](http://www.oregon.gov/ODOT/TD/TP/Tolling_Background.shtml)

Substantive changes in the cost of using an urban area's highway system can have broad effects on the regional economy. Therefore, congestion pricing needs to be approached with caution, using comprehensive and methodologically correct analyses. The novelty of pricing to any urban area implies the need for analysts to be open about assumptions, methods and levels of uncertainty. Extensive public involvement and discussion should be anticipated.

### Pricing approaches considered

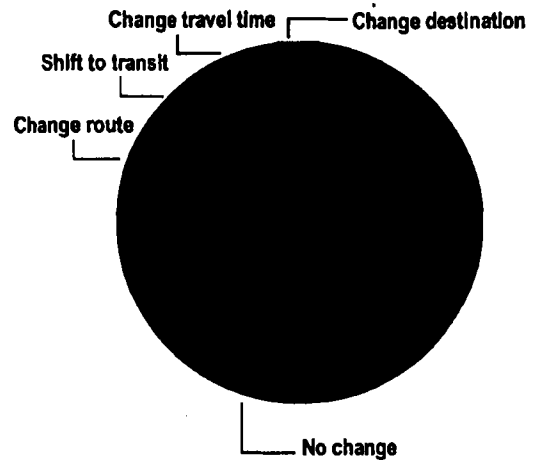
The white paper focuses on several ways that congestion pricing could be applied.

- **Area/cordon pricing:** Vehicles are charged to travel into or within a high activity center, such as a downtown or business district. Prices may vary by time of day to encourage motorists to enter the zone during less busy times or to use transit.
- **Tolling all highways in a metropolitan area,** also known as system tolling, which can also include major arterials.
- **Using pricing as an alternative to adding lanes.** This is often called "managed toll lanes" to maintain less congested travel conditions. In the United States, high occupancy toll (HOT) lanes are always located adjacent to a free lane.
- **Mileage-based pricing:** Tolling all roads in a given area to reduce congestion.

### Potential effects of congestion pricing

Congestion pricing adjusts the cost of using the highway system reflective of the level of demand. Charging a higher cost in congested conditions reduces the use of facilities, allowing those that pay the toll a faster, more reliable trip. The introduction of tolls to a previously "free" system, however, introduces some negative effects. First, some people may prefer retaining the money for the tolls to the faster travel

### Tolling/pricing projects and potential behavior changes



This chart is for illustrative purposes only. It is meant to demonstrate the types of changes people make when congestion pricing is implemented. Actual changes on any given project are site-specific and should not be expected to match these proportions.

times. Second, some might be "priced off" the system and the economic benefits associated with those trips would be lost. Third, traffic diversion is likely unless all roads are tolled, which can have a variety of negative environmental and social effects. Further, some of these factors may lead to long-term effects such as changes in land values and accessibility to particular locales, which may not become apparent for years.

Also, there are likely to be equity concerns given that lower income groups may have greater difficulty accommodating the cost of tolls. However, some research shows that members of low-income groups are willing to pay tolls if they know it means they won't be late for jobs, day care, or other time-sensitive priorities. All of these factors suggest that improved traffic flow is unlikely to be the sole determinant of the utility or political feasibility of a congestion pricing proposal.



### How should revenue be used?

Though congestion pricing is advocated as a means to better manage the transportation system, when implemented on a larger scale (through cordon pricing, system pricing, or managed lanes), significant revenues can be raised. How those revenues are spent is critical to addressing the fairness issue and building public support and acceptance for a project or proposal. It is impossible to understand how attempts to balance fairness will be achieved until the revenue use is determined. Examples of how revenue could be spent include:

- Investing in transit improvements in the affected area
- Improving the highway system (e.g., parallel arterials)
- Improving the tolled facility<sup>ii</sup>
- Rebating motor fuel taxes
- Reducing general taxes such as income or property
- Awarding unspecified grants to the affected communities
- Devising a system whereby users pay a price during peak hours, and those who travel during off-peak hours get a credit. Credits might be used for travel on another day or for transit.

### Conclusions

Determining whether a congestion pricing proposal makes sense requires detailed traffic and economic analyses. These include extensive and simultaneous knowledge about congestion levels on all parts of the transportation system as well as the ability to anticipate how each driver's trip-making decision would affect the overall system.

Aside from HOT lanes, there is very little real world experience with these forms of congestion pricing, making it difficult to reasonably predict the short and long term outcomes on issues such as traffic flow, land use, environmental effects, and others. It will be important to consider travel demand, economic effects and revenue forecasts to determine the effectiveness of a proposed project before it is approved or implemented. These issues are discussed in more detail in white papers 3 and 6.

Because these analytic methods are new, it is important that a deliberate, transparent and comprehensive process that is methodologically correct be employed for evaluating project assumptions and effects.

<sup>i</sup> National Cooperative Highway Research Program, Synthesis Compilation of Public Opinion Data on Tolls and Road Pricing, A Synthesis of Highway Practice, 2008.

<sup>ii</sup> Lessons learned from the FHWA's Value Pricing Pilot Program suggest that people support the use of tolls to benefit corridor-level improvements, including the transit system; or that toll revenue should only be spent for the benefit of those paying the toll, in particular, through investments in the highway being tolled. This is the traditional political justification for financing roads, bridges, and tunnels with tolls. These traditional public views of when tolling is justified run counter to the idea of recovering the marginal social cost of driving with tolls.

### For More Information

- Visit the Web site to read the white papers and complete a comment form:  
[www.oregon.gov/ODOT/TD/TP/Tolling\\_Background.shtml](http://www.oregon.gov/ODOT/TD/TP/Tolling_Background.shtml)
- Email: [Robert.A.Maestre@odot.state.or.us](mailto:Robert.A.Maestre@odot.state.or.us)



# Economic Comparison of the Alternatives for Tolling Projects

Highlights of Tolling White Paper 6



March 2009

## Overview

Tolling has been little used in Oregon. Elected officials and the general public will want to be assured that the benefits of a tolled/priced project justify the costs. Tolling White Paper 6 focuses on how to analyze and compare tolled and non-tolled project alternatives. This paper recommends using a Benefit-Cost Analysis (BCA) to quantify and compare the benefits and costs of a project. It also discusses other tools that could be used to understand the non-quantifiable effects.

## Benefit-Cost Analysis

BCA is currently used to evaluate transportation projects and this white paper suggests that it can provide an appropriate framework for decision makers to compare the costs and benefits of tolled and non-tolled project alternatives. Typical features of a BCA include:

- A long-term comparison period (usually 20 or 30 years) is used for all alternatives.
- A "no-build" alternative is included for comparison purposes.
- Inflation is assumed when comparing benefits over time.
- Monetary values are determined for benefits and costs.
- If the benefit-cost ratio is greater than 1.0, the benefits exceed the costs.

Typical user benefits and costs are shown below.

### Net User Benefits

- Net value of time saved
- Lower costs due to increased safety
- Lower vehicle operating costs

Seven technical tolling and pricing white papers were prepared for ODOT in February 2009 as a way to consider concerns and issues for Oregon to address prior to developing a tolling/pricing policy in the future.

1. Is tolling an effective means of reducing greenhouse gas emissions?
2. Where, geographically, could tolling work and under what circumstances?
3. Forecasting change – how do we incorporate tolling and pricing into our regional transportation models?
4. What are the economics of transportation system reliability?
5. How should the economic and social effects of broad applications of congestion pricing be assessed?
6. How do you determine if tolling a project is a better alternative than other non-tolled options and how would you choose between a number of tolled alternatives?
7. Are truck-only toll lanes a viable option for Oregon?

This document highlights White Paper 6 about the best method for an economic comparison of alternatives. Find all papers online and provide your comments: [www.oregon.gov/ODOT/TD/TP/Tolling\\_Background.shtml](http://www.oregon.gov/ODOT/TD/TP/Tolling_Background.shtml)

### **Costs**

- Construction costs, including toll collection costs
- Annual operating costs
- Maintenance costs
- Capital rehabilitation costs

### **What about non-quantifiable effects and environmental review?**

BCAs measure the economic efficiency of a project, but not other qualitative factors. Therefore, additional analyses will be required in order to understand the full range of project effects. These could include an environmental impact statement, economic impact analysis, financial analysis or other evaluations. Tolls paid by users are considered in economic impact analysis. These studies would provide information about how the project could affect jobs, wages, regional economic conditions, environmental quality, and issues of community and social importance.

### **Conclusions**

Because most tolling applications would be new to Oregon, it may be appropriate to develop a sound methodological approach for comparing tolling proposals to non-tolled alternatives. BCA can be an effective means of doing this. Project affordability and potential environmental or equity effects would need to be included with a separate process.

- BCA is recommended to quantify costs and benefits. However, other tools should be used to provide a complete analysis.
- Non-quantifiable benefits and costs should be addressed as part of a parallel process.
- White paper authors recommend that ODOT develop a transparent methodology for the public to review project analyses, including BCAs, before moving forward with a decision.

### **For More Information**

- Visit the Web site to read the white papers and complete a comment form:  
[www.oregon.gov/ODOT/TD/TP/Tolling\\_Background.shtml](http://www.oregon.gov/ODOT/TD/TP/Tolling_Background.shtml)
- Email: [Robert.A.Maestre@odot.state.or.us](mailto:Robert.A.Maestre@odot.state.or.us)

# Truck-Only Toll Lanes

## Highlights of Tolling White Paper 7



March 2009

**Truck-Only Toll (TOT) lanes** are limited access toll lanes available only for trucks. All tolls are collected electronically and the TOT lane is usually barrier-separated from other lanes.

The purpose of truck-only facilities is to promote safer traffic flow, reduce congestion and increase freight-hauling productivity. Currently there are only a few truck-only facilities in the United States and none of them are tolled. TOT lanes could provide a funding source for a project, but they must provide value to truckers in order to be used (and paid for).

Three types of TOTs are discussed in this white paper: urban corridors (to reduce congestion) port access (to move freight in and out) and rural/long haul routes (to increase freight productivity).

### Cost and Demand for TOT Lanes

The cost of TOT lanes depends on right of way requirements, design standards, whether an elevated or underground structure is needed, access/egress needs, and mitigation required due to environmental effects. Truckers would only use TOT lanes if they get value from using them, either because they provide a more reliable trip or increase productivity. The value of using the TOT lanes would need to be greater than the cost of the toll.

Long haul truckers would only pay a toll if the TOT lane increased productivity enough to offset the toll. Urban truckers would be most inclined to use TOT lanes to avoid congestion during peak hours, but might not pay a toll at other times of the day.

Seven technical tolling and pricing white papers were prepared for ODOT in February 2009 as a way to consider concerns and issues for Oregon to address prior to developing a tolling/pricing policy in the future.

1. Is tolling an effective means of reducing greenhouse gas emissions?
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3. Forecasting change – how do we incorporate tolling and pricing into our regional transportation models?
4. What are the economics of transportation system reliability?
5. How should the economic and social effects of broad applications of congestion pricing be assessed?
6. How do you determine if tolling a project is a better alternative than other non-tolled options and how would you choose between a number of tolled alternatives?
7. Are truck-only toll lanes a viable option for Oregon?

This document highlights White Paper 7 about truck-only toll lanes. Find all papers online and provide your comments: [www.oregon.gov/ODOT/TD/TP/Tolling\\_Background.shtml](http://www.oregon.gov/ODOT/TD/TP/Tolling_Background.shtml)

Projects would need to be evaluated to determine if TOT lanes would be cost effective given high construction costs and the potential for generating revenue only a few hours a day.

## Conclusions

TOT lanes appear to have little utility in Oregon because Oregon already allows longer-combination vehicles (three trailer-trucks) on highways, so the ability to improve productivity is limited. In addition, limited urban right of way, high construction costs, environmental concerns associated with expanding highway capacity and insufficient demand would decrease the utility of TOT lanes.

- Long haul truckers with three trailers on their trucks already operate on Oregon highways and congestion is not high enough to warrant dedicated TOT lanes.
- Portland is part of the most congested urban area in Oregon, and conditions will continue to get worse as the region continues to grow. If TOT lanes were only available in Portland, or another urban center, it is likely they would not be able to provide their intended value:
  - Truck demand remains level throughout the day but congestion typically occurs during peak hours. TOT lanes would only offer limited time saving during most days.
  - Long haul truckers would not find enough value to their overall trip to pay a toll for a short-distance TOT lane.
- Improving truck access to ports is not a significant concern for the state.
- Many toll roads are built with a combination of toll funds and government funds. Government officials would need to determine if subsidizing a TOT lane was the best use of public funds. Other options might be able to meet similar objectives and be more cost-effective.

## For More Information

- Visit the Web site to read the white papers and complete a comment form:  
[www.oregon.gov/ODOT/TD/TP/Tolling\\_Background.shtml](http://www.oregon.gov/ODOT/TD/TP/Tolling_Background.shtml)
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