



U.S. Department of Transportation
Federal Highway Administration

Effective Approaches for Advancing Congestion Pricing in a Metropolitan Region

A PRIMER ON LESSONS LEARNED AND
BEST PRACTICES

FHWA-HOP-12-030



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List of Abbreviations

BART	Bay Area Rapid Transit
BCA	Benefit-Cost Analysis
BRT	Bus Rapid Transit
Caltrans	California Department of Transportation
CBD	Central Business District
CMP	Congestion Management Process
DC	District of Columbia
DOT	Department of Transportation
EIS	Environmental Impact Statement
EJ	Environmental Justice
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
GDOT	Georgia Department of Transportation
GHG	Greenhouse gas
GPS	Geographic Positioning System
HOT	High Occupancy Toll
HOV	High Occupancy Vehicle
HOV 2+	Vehicles with two or more occupants
HOV 3+	Vehicles with three or more occupants
HUD	Department of Housing and Urban Development
I-30	Interstate 30
ITS	Intelligent Transportation Systems
L.A.	Los Angeles
L.A. Metro	Another name for the above, Los Angeles County Metropolitan Transportation Authority
LACMTA	Los Angeles County Metropolitan Transportation Authority

MBUF	Mileage Based User Fee
MNDOT	Minnesota Department of Transportation
mph	miles per hour
MPO	Metropolitan Planning Organization
MTC	Metropolitan Transportation Commission
MWCOG	Metropolitan Washington Council of Governments
NCTCOG	North Central Texas Council of Governments
NEPA	National Environmental Policy Act
NGO	Non-Government Organization
NYMTC	New York Metropolitan Transportation Council
PPP	Public-private Partnership
PSRC	Puget Sound Regional Council
ROW	Right of Way
SCAG	Southern California Association of Governments
SFCTA	San Francisco County Transportation Authority
SOV	Single Occupancy Vehicle
SR	State Route
TAZ	Traffic/Transportation Analysis Zone
TIP	Transportation Improvement Plan
TXDOT	Texas Department of Transportation
U. S. DOT	United States Department of Transportation
U.S.	United States
VMT	vehicle miles traveled
WSDOT	Washington State Department of Transportation

Executive Summary

Congestion pricing strategies offer potential benefits to communities from an economic, environmental, and social perspective. However, these strategies face significant political challenges in gaining acceptance as a viable option in regional planning. While some success has been achieved on individual pricing projects, such as conversion of high-occupancy vehicle (HOV) lanes to high-occupancy toll (HOT) lanes and demonstration projects funded by Federal grants such as the Value Pricing Pilot Program, many of these efforts have been focused on individual projects, and there has been limited consideration of the broader role that congestion pricing can play in a regional context.

This primer is intended to raise awareness among staff at MPOs and their partner agencies about the potential role of congestion pricing in supporting regional goals as well as the most effective approaches for advancing congestion pricing strategies in a region. It draws upon lessons learned from pilot and ongoing programs implemented around the United States as well as efforts to integrate congestion pricing into regional transportation plans. Using illustrative case studies, this primer provides detailed information on:

- How congestion pricing can support various regional planning goals, including providing needed funding for transportation system investments; and
- Effective approaches for addressing the challenges of advancing congestion pricing in a regional context, including addressing public acceptance, equity concerns, interagency collaboration, and analytical issues associated with the metropolitan transportation planning process.

The content of the primer is primarily based on discussions that took place at four peer to peer-to-peer practitioner workshops organized by FHWA in Atlanta, Chicago, Denver, and Washington, DC in September 2011. The workshops included presentations and panel discussions focusing on lessons learned by practitioners from different regions of the country who have implemented, planned, or conducted studies for congestion pricing programs. Participants at the workshops included MPO planners, Federal and State DOT staff, and representatives from transit agencies, tolling authorities, and consulting firms.

The key themes around which the discussion and examples in this primer are centered include:

- Building Public and Decisionmaker Acceptability
- Linking Congestion Pricing to Regional Goals and Objectives
- Achieving Interagency Collaboration
- Analyzing Congestion Pricing Impacts as Part of the Planning Process
- Addressing Implementation Challenges and Sustaining User Support

The primer ends with recommendations of initial steps that planners, policymakers, and others can take in developing comprehensive regional congestion pricing plans, while maximizing the chances of acceptance from the public and decisionmakers.

1. Introduction

For decades, transportation agencies have directed their planning efforts at meeting regional goals of mobility, accessibility, and economic vitality. As metropolitan planning organizations (MPO), and their planning partners at State Departments of Transportation (DOT), transit agencies, and local governments work together to develop metropolitan transportation plans, many agencies are looking for innovative approaches to advance these regional goals, while functioning in economically constrained times.

Congestion pricing approaches – including various forms of road pricing, parking pricing, and mileage-based user fees – offer potential benefits to communities from an economic, environmental, and social perspective. However, these strategies face significant political challenges in gaining acceptance as a viable option in regional planning. While some success has been achieved on individual pricing projects, such as conversion of high occupancy vehicle (HOV) lanes to high occupancy toll (HOT) lanes and demonstration projects funded by Federal grants such as the Value Pricing Pilot Program, many of these efforts have been focused on individual projects, and there has been limited consideration of the broader role that congestion pricing can play in a regional context.

To advance congestion pricing at a regional scale, transportation planners, decisionmakers, and the public need a better understanding of the role of congestion pricing in addressing regional goals and transportation funding needs. They also can benefit

from lessons learned from regions that have begun to study and plan for congestion pricing as part of their metropolitan transportation plans.

Purpose of the Primer and Intended Audience

As part of the Federal Highway Administration’s (FHWA) Congestion Pricing Primer series, this primer is intended to raise awareness among staff at MPOs and their partner agencies about the potential role of congestion pricing in supporting regional goals as well as the most effective approaches for advancing congestion pricing strategies in a region. It draws upon lessons learned from pilot and ongoing programs implemented around the United States

What Is “Congestion Pricing”?

Congestion pricing – sometimes called value pricing – is a way of harnessing the power of the market to reduce traffic congestion and/or maintain free flowing conditions on parts of the transportation system. Congestion pricing works by shifting travel (including purely discretionary rush hour highway travel as well as commuters with flexibility) to other transportation modes or to off-peak periods. By removing even 5 percent of the vehicles from a congested roadway, pricing enables the system to flow much more efficiently, allowing more cars to move through the same physical space. There is a consensus among economists that congestion pricing represents the single most viable and sustainable approach to reducing traffic congestion.

Source: Adapted from FHWA, Congestion Pricing, A Primer: Overview, FHWA-HOP-08-039, (Washington, DC: October 2008).

as well as efforts to integrate congestion pricing into regional transportation plans. Using illustrative case studies, this primer provides detailed information on how congestion pricing can support various regional planning goals and effective approaches for addressing the challenges of advancing congestion pricing in a regional context.

Based on the common agenda of the four congestion pricing workshops, this primer includes the following key themes around which the discussion and examples are centered.

- **Building Public and Decisionmaker**

Acceptability: This involves addressing concerns about equity and fairness, revenue use, credibility of the agencies involved in implementation, privacy, and user perceptions about being charged to use roads already paid for through fuel taxes. Ensuring an early, ongoing, and broad engagement process involving planners, decision makers, stakeholders, and the public, while communicating the role of congestion pricing in solving severe regional problems is crucial. Including congestion pricing in a bundle of complementary strategies acceptable to a range of stakeholders, using data from existing projects and modeling studies, and implementing a short-term pilot program to prove the effectiveness of the strategy are other effective measures to build acceptability. Finding allies among decisionmakers and local leaders, and engaging experts and businesses also helps build broad-based support for a congestion pricing program.

- **Linking Congestion Pricing to Regional Goals and Objectives:** The objectives of the planned congestion pricing program must be clearly linked to regional planning goals such as environmental sustainability and economic development and this understanding must be communicated to the public and to decisionmakers. This helps planners in developing pricing programs as part of a comprehensive approach to achieving regional goals. When pricing programs are implemented, ongoing monitoring and evaluation must ensure that the program is achieving previously identified goals, objectives and system performance targets.

- **Achieving Interagency Collaboration:** This involves coming to an agreement between agencies and jurisdictions on how best to achieve regional goals and objectives, how to allocate the costs and revenues of a congestion pricing program, how to manage and operate the program, and how to work across cultural differences and silos between and within agencies. Early in the process, it is critical

to establish regional partnerships that clearly identify regional roles and responsibilities, while drawing on the unique strengths of each agency. High level political leadership and support can also be important for achieving collaboration among agencies.

- **Analyzing Congestion Pricing Impacts as Part of the Planning Process:** Analyzing the full regional or project-level traffic, economic, and social impacts of a congestion pricing program requires significant technical capability and data. Potential changes in travel behavior are often difficult to predict. However, the use of improved travel demand models and other tools has helped many regions analyze these impacts in a robust way at different stages of planning. In addition, the use of data based on observed impacts and pilot projects, collection of new data where needed, the use of cost-benefit analysis and revenue estimation tools, as well as an early focus on analyzing potential equity impacts have proved to be effective practices in several regions.

- **Addressing Implementation Challenges and Sustaining User Support:** Legislative barriers, such as the lack of authority to implement tolling on previously free facilities and limits on the use of revenues, have been a key challenge in many regions. Obtaining funding for pricing projects and limited user experience with the pricing concept and technology have also been common implementation challenges. Establishing a supportive policy framework for implementing regional pricing programs, involving the private sector, establishing conditions for revenue use, and managing how prices may be adjusted if the future have proved effective. In addition, ensuring that the user experience is seamless, creating opportunities for the public to test and become familiar with the technology, and developing ways to enforce occupancy requirements without burdening users are important for sustaining user support.

The discussion of these themes draws directly from practitioner experiences and effective strategies that were employed in planning and implementing

congestion pricing programs. This primer is designed for transportation planners at the State, regional, and local levels as well as for key stakeholders in the planning process, such as transit agency officials and decisionmakers involved in regional transportation planning and policy making. It is also meant to support the broader audience of stakeholders involved in all aspects of transportation and community decisionmaking, from elected officials and interested citizens to practitioners in related fields such as the environment and land use.

Process of Developing the Primer

As part of the Congestion Pricing Primer series, FHWA's Office of Operations published "Congestion Pricing – A Primer: Metropolitan Planning Organization Case Studies" in 2011. Pricing programs have often come about separate from the traditional metropolitan planning process through pilot projects and demonstrations. Given that the federally funded pricing demonstration projects have shown congestion pricing to be an effective tool in addressing regional goals, there is a growing interest in incorporating such programs into metropolitan transportation plans.

The case studies examine how congestion pricing was incorporated into metropolitan transportation plans in four regions: Dallas/Fort Worth, the Puget Sound region, Minneapolis/St. Paul, and the San Francisco Bay area. The progression of congestion pricing through the planning process follows a unique path in each of these regions, based on each region's own history of attitudes towards pricing, jurisdictional relationships, and politics that influence how pricing is perceived. The case studies thus offer valuable lessons to support other MPOs seeking to do the same.

This primer builds on those four case studies, drawing on discussions from a series of four peer-to-peer practitioner workshops organized by FHWA. These one-day workshops were held in September 2011 in Atlanta, Chicago, Denver, and Washington, DC and involved presentations and discussions about challenges and opportunities for advancing congestion pricing in a regional context. The objective of the workshops was to provide technical assistance to help transportation practitioners understand the technical, institutional,

political, and public involvement issues associated with planning and implementing congestion pricing strategies to advance regional goals. Participants at the workshops included MPO planners, Federal and State DOT staff, and representatives from transit agencies, tolling authorities, and consulting firms. The content of this primer has been developed primarily from the discussions that took place at these workshops.

The focus of the workshops was on the role of congestion pricing in supporting funding and regional goals and how to integrate pricing into metropolitan transportation plans. The workshops included sessions on lessons learned from experience with congestion pricing and metropolitan planning and included presentations and panel discussions by practitioners from different regions of the country who have implemented, planned, or conducted studies for congestion pricing programs. Through these sessions, workshop participants shared their perspectives and presenters provided insights from their experiences. This information forms the basis for this document and has been supplemented by a literature review, case studies of congestion pricing programs, and the results of the research on the impacts of these programs.

Types of Congestion Pricing Strategies to Consider in Regional Planning

There are a variety of ways to use price signals to reduce congestion in the transportation network. This primer defines five types of congestion pricing strategies, each of which works slightly differently, and a number of which can be used in combination. For a pricing strategy to be considered congestion pricing, it must vary by time of day or level of congestion or reward the use of higher occupancy vehicles so as to impact traffic flow directly. Some forms of congestion pricing only charge on individual lanes or segments of the system, providing an option for faster travel time for those willing to pay.

Variably Priced Lanes

Variably priced lanes are separated lanes on a roadway that involve variable tolls. The amount paid depends on the level of congestion in the area or the time of day (this is usually linked to expected levels of congestion), and may also vary based on the number of occupants in the vehicle.

The two main types of priced lanes are *express toll lanes* and *high occupancy toll (HOT) lanes*. Express toll lanes involve tolls that are set at a level to maintain a target speed or level of traffic flow. HOT lanes also consider the number of occupants in the vehicle,

Urban Partnership Agreement program, regional partners in the Seattle area – the Puget Sound Regional Council (PSRC), the Washington State Department of Transportation (WSDOT) and King County – have introduced new tolls on State Route 520, setting toll rates on the facility based on demand.

Examples of Variably Priced Lanes

- State Route 91 in Orange County, California, began to price two lanes in 1995, with tolls varying by time of day, day of the week, and direction. Tolls can range from \$1.20 to \$10.00.
- The I-30 corridor in Dallas has two reversible express lanes allowing single occupancy vehicles (SOVs) to pay a fee and HOVs to pay up to 50 percent less than the SOV rate, with tolls set dynamically based on congestion.

reducing or eliminating tolls for carpools, vanpools, or transit vehicles using the lane. Vehicles that do not meet the occupancy requirement may choose to use HOT lanes, but will have to pay a toll.

Lanes that were previously high occupancy vehicle (HOV) lanes can be converted to HOT lanes to allow vehicles not meeting the occupancy requirements to take advantage of the reduced travel time if they are willing to pay a higher toll. Transportation agencies can also choose to add express toll lanes or HOT lanes to existing highways.

Variably Priced Highways, Bridges, or Tunnels

In this approach, rather than pricing one lane of a general use highway, the entire highway, bridge, or tunnel facility is priced with variable tolls. Some portions of the facility might have minimal or no tolls at off-peak times, with these tolls increasing significantly at peak periods.

At present, no free roads within the United States have been fully converted to priced highways with all lanes tolled. However, new toll roads with variable pricing have been constructed (e.g., the Intercounty Connector in Maryland) and some bridges (e.g., bridges connecting New York City and New Jersey) have introduced variable pricing to help smooth the flow of traffic, allowing the road to move more vehicles per hour than it would under congested conditions. Under U.S. DOT's

Priced Zones

A priced zone levies a charge on vehicles entering or driving within a particular area – usually a central business district (CBD). This can be used to reduce traffic within a CBD by shifting trips to other modes or encouraging carpooling. There are two main

ways to design a priced zone:

1. *Cordon pricing* involves setting a fee for all vehicles entering a CBD. The fee can be fixed or can be variable by time of day, congestion levels, vehicle type, or occupancy, as with other types of congestion pricing (e.g., lowering fees for commercial delivery trucks during off-peak hours or charging more during events or other particularly congested periods). Once the vehicle crosses into the zone and has paid the fee, the vehicle may move freely within the cordoned area.

2. *Areawide pricing* involves charging a vehicle a trip-based or distance-based fee (e.g., per mile) for driving within a designated area. This type of pricing charges drivers for how much they drive within a congestion pricing zone, not just for entering it. As with cordon pricing, the charge under area pricing may vary by time of day or vehicle characteristics. Although congestion reduction is often the primary objective, cities also seek to reduce emissions, noise, traffic accidents, and improve pedestrian access and enjoyment of public spaces and businesses.

Although cordon and areawide pricing approaches do not currently exist in any U.S. city, they have been proposed in New York City, Los Angeles, and San Francisco and have been implemented in cities internationally.

Priced Road Networks

Pricing a road network can mean applying any of the strategies described above to a network of roadways, which may include freeways and arterials. This allows for the road network to be variably priced throughout the day, leading to a systemwide improvement in performance.

Pricing a network of roadways minimizes diversion effects (e.g., increased traffic on arterials from travelers trying to avoid tolls on the freeways can be prevented by setting charges on both to achieve optimal traffic flow). By pricing a larger number of facilities, a greater number of people are encouraged to change their travel behaviors.

The Puget Sound Regional Council (PSRC), the MPO for the Seattle region, studied the implications of a fully priced regional road network, and its long-range metropolitan transportation plan calls for full highway system tolling by approximately 2030.

Pricing not Involving Tolls (e.g., Variable Parking Pricing, Vehicle Miles Traveled Fees)

Transportation facilities can be priced using other methods besides tolls to manage congestion and increase incentives to shift the time of travel or mode used. Parking pricing can be implemented so that parking in congested areas at peak times is more costly, which increases the incentive to take alternative forms of transportation and frees up parking spots for those who are willing to pay, thereby reducing time (and driving) required to find a spot. Rates can also change based on length of time (e.g., charging by the minute or quarter hour, or increasing rates after the first hour) to encourage people to stay for shorter periods. For instance, SFPark in San Francisco is a program that aims to reduce congestion from cruising for parking by providing users with real-time information about parking availability both through a website as well as through smartphone applications and adjusting parking prices based on demand. Pricing based on vehicle miles traveled (or VMT-based fees) can involve a fee levied on a

per-mile basis that can vary by location, time or day, or congestion levels. For instance, the State of Oregon has studied the application of mileage-based fees through a pilot project and tested technologies that allow higher rates within a designated congestion zone or when driving during peak-periods.¹

Organization of the Primer

This section described the common types of congestion pricing strategies that may be considered at the regional level along with examples of each, where available. Section 2 describes how each of the above types of congestion pricing strategies can be applied to support and advance planning goals in a region.

Following that, Section 3 addresses the important challenges related to planning and implementing congestion pricing and discusses public and decisionmaker acceptability, achieving regional collaboration, analytical limitations, legislative barriers, as well as a variety of other challenges discussed at the four workshops.

Section 4 provides potential solutions to these challenges using case examples from regions that have implemented them, with a focus on effective approaches for integrating congestion pricing into metropolitan transportation plans.

Section 5 provides insights on steps for getting started with advancing congestion pricing in regional plans and programs, which may be helpful for regions that want to get started in considering congestion pricing in a regional context.

Examples of Priced Zones

- Stockholm has a cordon around the city center with charges to enter and leave the zone. In the initial trial period, there was a 22 percent drop in vehicle trips and bus ridership rose 9 percent.
- London's congestion pricing scheme charges £8 (about \$12) to enter the central business district between 7 a.m. and 6:30 p.m., with exemptions for motorcycles, taxis, the disabled, alternative fuel vehicles, buses, and emergency vehicles. However, the fee does not vary based on congestion or time of day. Congestion reduced by 30 percent consistently in the first two years after implementation.

Source: TRB Report 686, "Road Pricing: Public Perceptions and Program Development," Transportation Research Board, 2011.

The Resources section lists useful Federal, State, and local technical studies and guidance documents for further reference.

2. Benefits from Using Congestion Pricing to Support Regional Goals

Congestion pricing strategies can support regional goals by providing two direct benefits: improving multimodal system performance and generating revenues for transportation investments. These impacts, in turn, provide the opportunity to support multiple planning goals, including improving economic competitiveness; supporting environmental quality (e.g., air quality), energy efficiency, and sustainability (e.g., reducing fuel consumption and greenhouse gas emissions); enhancing travel options and livability; and supporting a state of good repair for infrastructure.

Improving Multimodal Transportation System Performance

Traffic congestion in urban areas, at ports, and other areas (e.g., beach vacation destinations, special event lo-

cations), creates travel delays that lead to real economic costs for regions, decreased reliability, and increased pollutant and greenhouse gas emissions, in turn leading to public health impacts. Many people feel the effects of congestion, including vehicle occupants and transit riders who must endure time stuck in traffic and businesses that are impacted due to congestion-related delays affecting their distribution of goods.

Congestion pricing can potentially improve the performance of the transportation system across modes in the following ways:

- **Managing Traffic Congestion.** Congestion pricing can be an effective tool to manage travel demand. By pricing travel to more accurately account for its full costs, congestion pricing provides incentives for travelers to shift some trips to off-

peak times, less-congested routes, or alternative modes; to combine trips; or even to eliminate some trips altogether. Pricing, therefore, can prevent a breakdown of traffic flow and help maintain vehicle throughput during peak periods.

- **Providing a Faster, More Reliable Travel Time Option.** Some pricing options, such as managed lanes with congestion pricing, can help to guarantee a faster, more reliable travel time for those who pay to use the priced lanes, and can result in improved transit on-

Speed and Travel Time Improvements Resulting from Different Forms of Congestion Pricing

- **High-occupancy toll (HOT) lanes:** Evaluations of HOT lanes on I-15 in San Diego and Katy Freeway in Houston show 11-20 minute travel time savings for HOT lane users. The variably priced Miami I-95 Express Lanes have improved speeds not only for express lane users but also for those in the general use lanes.

- **Variable pricing based on time of day or congestion levels:** An off-peak toll discount program in Lee County, Florida showed that 71 percent of drivers shifted their time of travel at least once a week to take advantage of the off-peak discounts. When the Port Authority of New York and New Jersey began charging variable tolls based on time of day on its bridges and tunnels, time savings of up to 20 minutes were observed at certain locations.

- **Cordon pricing in London, Stockholm, and Singapore:** Compared to pre-charging levels, the number of vehicles entering the charging zone dropped by 24 percent after the implementation of electronic congestion pricing in Singapore, by 14 percent after pricing was introduced in the western part of London, and by 20 percent in Stockholm. Average travel speeds increased by 28-30 percent in both Singapore and London.

Source: TRB Report 686, "Road Pricing: Public Perceptions and Program Development," Transportation Research Board, 2011.

time performance. By converting an under-utilized HOV lane to a HOT lane that attracts increased traffic volumes, traffic on the general use lanes may also be improved. Conversely, converting an over-utilized HOV lane to a HOT lane may disincentivize its use, smoothing traffic on the managed lanes segment of the roadway.

Evaluation results from implemented projects show how different types of congestion pricing strategies can improve transportation system performance and provide additional travel options. Even a small reduction in traffic may significantly improve system performance and reliability for transit and personal motor vehicles, as shown in the examples highlighted throughout the remainder of this section.

Generating Revenues for Transportation Investments

It is widely recognized that one of the greatest challenges in the coming years will be preserving, operating, and enhancing the Nation's transportation system in an era of limited funding, expanding needs, and increasing costs. Increasingly, there is recognition that traditional fuel taxes are inadequate to meet revenue needs because tax rates have not kept pace with inflation, improvements in vehicle fuel economy are diminishing their value, and investment needs continue to grow.

Congestion pricing is a potential funding source for highway infrastructure improvements and for on-going highway maintenance, operations, and management, transit services, and other related investments. For instance, excess revenues remaining from funding operating costs of HOT lane projects in Miami, San Diego, Minneapolis, and Los Angeles are being used to fund transit improvements, ridesharing programs, traffic management using ITS, or travel demand management programs in the HOT lane corridors.

The State of Washington expects the recently implemented variable pricing on the SR 520 bridge connecting Seattle to Redmond to contribute funds toward constructing the new bridge. Revenues from the pricing will be combined with traditional Federal and State funds. Revenues from cordon pricing in London, Singapore, and Stockholm have been used in part to fund regional transit improvements in each of these cities.

Using Congestion Pricing to Support Long Range Funding Needs in the Seattle Region

PSRC has included congestion pricing as a key element of its Transportation 2040 Plan with a financing plan that suggests a long-term shift in how transportation improvements are funded, with greater reliance on congestion pricing.

The plan states that over time, sources of transportation funding in the region could include high-occupancy toll (HOT) lanes, facility and bridge tolls, highway system tolls, charges for vehicle miles traveled (VMT), and other pricing approaches that replace the gas tax while funding and managing the transportation system. The plan calls for full highway system tolls by approximately 2030.

Apart from the ability to raise revenues directly, congestion pricing also offers the opportunity to involve the private sector in financing the capital costs of new lanes/facilities because of the potential to generate returns. For example, managed lanes on I-635 (LBJ Freeway) and North Tarrant Express in Dallas and Fort Worth are being constructed with 60-70 percent private sector funding. In Virginia, a private sector consortium has entered into a public-private partnership with the Commonwealth of Virginia to build four new HOT lanes on the Capital Beltway, funding about 60 percent of project costs through private equity, loans, and bonds that will be paid for by the tolls levied on motorists who choose to use the new HOT lanes.

The extent to which the revenues from congestion pricing can support transportation needs on a regional level will depend on the scale and type of proposed pricing projects. Regional or broad-based pricing, such as regional networks of priced facilities proposed in the San Francisco Bay and Puget Sound areas will be more suited for this purpose than individual projects like a single HOT lane. Some MPOs that are including pricing strategies in their metropolitan

transportation plans to meet transportation investment needs include the North Central Texas Council of Governments (NCTCOG) for the Dallas region, the Puget Sound Regional Council for the Seattle region, the Metropolitan Council for the Minneapolis/St. Paul Twin Cities region, and the New York Metropolitan Transportation Council (NYMTC) for the New York region.

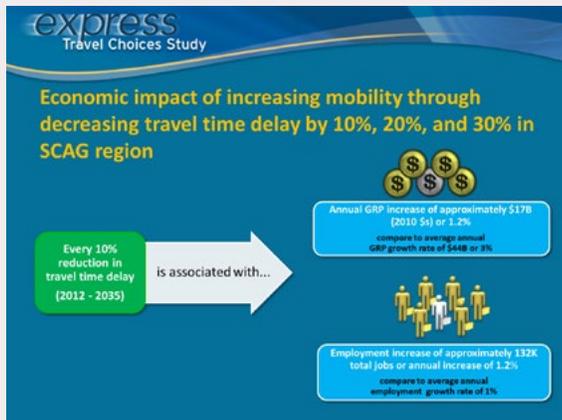
Supporting Economic Competitiveness / Freight Movement

Congestion pricing can lead to improved economic competitiveness by supporting reliable and timely access to employment centers, educational opportunities, services, and other basic worker needs as well as improved business access to markets. It may also reduce the economic costs of congestion-related delays, which, according to the Texas Transportation Institute's 2010 Annual Urban Mobility Report, stood at \$115 billion in the form of 4.8 billion lost hours and 3.9 billion gallons of wasted fuel nationwide.

Congestion affects the productivity of not only workers, but also businesses, who are constrained by time-bound schedules for the delivery of goods. These effects are critical in industries that rely on time-sensitive shipments or those that rely on freight movement as a significant portion of their supply chain costs. Congestion and reduced reliability on the transportation network therefore affect the accessibility, operations, productivity, and competitiveness of the Nation's businesses across virtually all economic sectors. Giving motorists the option to pay for a congestion-free ride provides greater choice for travelers and reduces the overall costs of congestion by allowing high-value and time-sensitive trips to occur with faster travel times than trips where travel time is of less importance. In addition, it maximizes economic return on existing investment by optimizing use of the transportation infrastructure.

Linking Congestion Pricing to Economic Development in Los Angeles

The Southern California Association of Governments (SCAG) has linked its congestion pricing proposals to an economic development strategy for the region. Its analysis shows that an annual delay of 10 percent leads to a decrease in employment and gross regional product. With the adoption of the last regional transportation plan in 2008, the MPO Board approved an extensive study of congestion pricing options that can be integrated into the plan, called the Travel Choices Study. The key goals of the study are to increase productivity, improve air quality, increase revenues to meet shortfalls in funding, and to reduce congestion as an economic development strategy.



Southern California Association of Governments (SCAG)

Supporting Environmental Quality, Energy Efficiency, and Sustainability

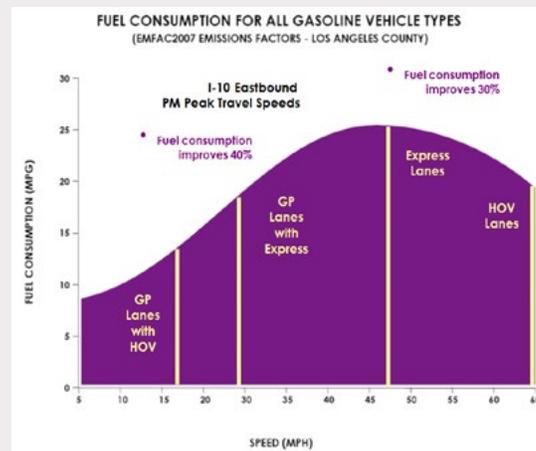
Motor vehicles are a significant cause of air pollution that harm human health, including carbon monoxide, particulate matter, and ozone precursors (hydrocarbons and nitrogen oxides), as well as carbon dioxide and other greenhouse gases (GHGs) that contribute to climate change. Moreover, areas with current or past air quality problems must demonstrate through the transportation conformity process that their long-range plans do not impede the ability to attain or maintain air quality standards. Congestion pricing strategies can support environmental quality through both reduced fuel consumption and decreased pollution and greenhouse gas emissions, as explained below.

- **Reducing VMT.** By charging a price for road use, pricing can encourage road users to take transit, walk, bike, carpool, or telework rather than driving alone during peak periods. This would result in a reduction in VMT, emissions, and fuel consumption.
- **Improving traffic flow.** Traffic congestion can lead to increased emissions due to excessive starts, stops, and idling. By improving traffic flow, congestion pricing can help to improve localized and regional air quality. For instance, an emissions analysis for the planned San Francisco Bay Area HOT lane network showed a 10 percent reduction in particulate matter emissions and 7 percent reduction in carbon dioxide emissions compared to the existing HOV networks.
- **Providing funding to support transit and other options.** Road and parking pricing revenues can be used to support improvements in transit services, bicycle and pedestrian infrastructure, or other options, which in turn can reduce automobile-based travel.

Enhancing Travel Options, Transit, Livability, and Sustainability

Livability in transportation is about improving quality of life by creating travel choices within more balanced multimodal transportation networks while supporting and enhancing communities. The concept of livability was given greater clarity and definition through the six livability principles established by the Sustainable Communities Partnership between

Potential Fuel Consumption Benefits of Managed Lanes



An analysis of express lanes in Southern California suggests that the lanes could improve vehicle fuel economy both in the express lanes (by lowering speeds compared to having them operate as HOV lanes) and in the general purpose lanes (by increasing speeds).

Source: *Metro ExpressLanes Concept of Operations, 2009, LACMTA*

the U.S. DOT, EPA, and HUD (see text box). The ways in which pricing enhances economic competitiveness have already been discussed above. Pricing can support livability in other ways as well by:

- **Providing more transportation choices.** Congestion pricing can improve the speed and reliability of express bus services, making them more attractive to commuters while reducing operating costs, and can facilitate deployment of bus-rapid-transit (BRT) operations in major corridors (such as the US-36 Express Lanes project planned in Colorado). For example, the Miami I-95 Express Lanes were created specifically to meet the goal of encouraging the use of transit and carpooling. Moreover, revenues from congestion pricing also can be used to enhance transit system capacity, ridesharing programs, and amenities for pedestrians and bicyclists.

Indirectly, pricing strategies, including parking pricing, can make downtown or congested areas

more hospitable to pedestrians, bikers, and transit users by reducing vehicle travel. In London, when congestion pricing was first introduced in 2003, excess waiting times for buses decreased over 30 percent, and bus speeds improved by 6 percent in the charging zone. This improvement, along with significant bus capacity enhancements, resulted in a 37 percent increase in the number of bus passengers entering the charging zone after congestion charging was introduced.² Moreover, by reducing downtown traffic congestion, cordon pricing can enhance the walkability of an area as well as its ability to accommodate bikes and transit vehicles.

▪ **Supporting existing communities.** Pricing can help preserve existing communities by optimizing the efficient use of existing infrastructure and preventing or delaying the need for capacity building that could significantly alter community character. According to one study, building new highway infrastructure can lead to decentralization and increased sprawl, while management of existing infrastructure improves the vitality of existing communities.³ Congestion pricing can also lead to a reduction in the number of traffic accidents, as occurred in London.⁴

Supporting a State of Good Repair

Congestion pricing generates funds that can be used to maintain existing infrastructure in a state of good repair. Because maintenance of existing transportation infrastructure is often a significant portion of to-

tal transportation funding needs, revenues generated from congestion pricing can help to support maintenance and preservation of existing transportation infrastructure.

Designing Congestion Pricing Strategies to Achieve Regional Benefits

The benefits of congestion pricing strategies and the extent to which they help support regional goals depend on both the type of pricing strategy and on how revenues are used. Different forms of congestion pricing will have different impacts and may be used to support different goals. For instance, construction of new highway capacity, even with variably priced toll roads, may not yield emissions reductions if it facilitates longer distance travel. However, options, such as pricing existing facilities and parking pricing are likely to result in more significant shifts in travel behaviors in ways that reduce vehicle travel and have emissions benefits. Targeted investments in managed lanes also may help to alleviate unnecessary delay and pollution. The benefits also depend in part on whether revenue from pricing is used to fund transit, bicycle, and pedestrian infrastructure or road improvements. For instance, the city of Austin, Texas, established a parking benefits district by metering on-street parking and dedicating the net revenues to infrastructure improvements in the neighborhood that promote walking, cycling, and transit use, such as sidewalk enhancements and the addition of bicycle lanes.

By developing consensus on regional goals and objectives, regional congestion pricing strategies can be designed to help support these goals. For instance, in the Minneapolis/St. Paul region, congestion pricing was implemented initially both to achieve better utilization of HOV lanes by conversion to HOT lanes and to provide more options for travelers. In Southern California, a key goal for congestion pricing has been to reduce congestion in order to improve economic competitiveness. In the Seattle region, PSRC's Transportation 2040 plan includes pricing on a regional level as part of an overall strategy to support sustainability and reduce greenhouse gas emissions while simultaneously addressing revenue needs. In the Dallas region, air quality improvement, congestion management,

The Partnership for Sustainable Communities Six Livability Principles:

1. Provide more transportation choices
2. Promote equitable, affordable housing
3. Enhance economic competitiveness
4. Support existing communities
5. Coordinate policies and leverage investment
6. Value communities and neighborhoods

Source: U.S. EPA, "HUD-DOT-EPA Partnership for Sustainable Communities." Available at <http://www.epa.gov/smartgrowth/partnership/indexhtml>

and the need to raise funds for maintenance have all been key issues. Given growth in the Dallas region's population and the limited funding available, the region has recognized that tolling is the most viable way to provide new capacity, leading to the development of

public-private-partnerships (PPPs) to fund managed lane projects. The regional goals that were discussed at the workshops, for which congestion pricing is being considered in a wide range of regions, are listed in the Appendix (table 1).

3. Challenges Associated with Planning and Implementing Congestion Pricing

To date, congestion pricing strategies have emerged primarily from planning around single projects, such as a new HOT lane project or toll road, rather than from a broader consideration of pricing as part of metropolitan long-range transportation plans. Although congestion pricing has the potential to support regional goals and is a more economically efficient way to manage transportation, planners face a number of challenges in considering congestion pricing at a regional level.

Achieving Public and Decisionmaker Acceptability for Congestion Pricing

Addressing public concerns and potentially negative attitudes toward congestion pricing is critical to successfully integrating congestion pricing into transportation planning and to implementing acceptable and lasting pricing programs. Although there have been several notable successes in implementing congestion pricing, the adoption of these strategies has been somewhat slow, in part due to political expectation of public opposition to paying a direct charge for using roads and the newness of the concept. Congestion pricing essentially calls for a paradigm change, but agencies planning and implementing these programs face challenges because of a range of concerns raised by decisionmakers, the public, and other stakeholders. These often include:

- **Equity and fairness concerns, particularly about adverse effects on low-income groups, local businesses, and jobs.** Common equity issues include:

- ▶ *Income equity* issues, which arise from perceived disproportionate impacts on low-income people because congestion pricing charges represent a larger share of their income, thus limiting their use of priced facilities or tolled lanes. For this reason,

express or HOT lanes have often been referred to as “Lexus Lanes.” Inflexibility of work schedules for some people who may be affected by pricing during peak commute hours is often a related issue.

- ▶ *Geographic equity* concerns, which arise from a greater negative impact on people living/working in locations affected by a priced facility or zone as in area-wide and cordon-based pricing programs, and when tolls are imposed on a new, expanded, or existing facility in one part of a region but not on others. For instance, these may be concerns that pricing entry to downtown areas will negatively impact suburban residents.

- ▶ *Modal equity*, which relates to concerns that converting HOV-only lanes to HOT lanes may create a disadvantage to transit as more single occupancy vehicles start using the lanes. This was a key concern with the I-394 HOT lanes in Minneapolis/St. Paul.

- **Concerns about how revenues will be used.** The manner in which revenues are used plays a pivotal role in program acceptability, affecting both the actual and perceived equity of congestion pricing. Concerns may arise about the fair distribution of revenues among jurisdictions as well as the extent to which those who pay the fees benefit from the use of revenues. Congestion pricing is seen as a “revenue grab” in regions where there is no experience with tolling or congestion pricing programs.

- **Mistrust of toll authorities and private sector involvement in collecting tolls.** The public and decisionmakers often have doubts about how toll revenues will be used when independent toll authorities or the private sector collects revenues. In addition, the public is often concerned that private entities will raise the tolls as needed to achieve profitability without consideration of economic and social issues.

- **Perceptions about “paying twice” for the use of roads.** The public may perceive that congestion pricing means paying twice for the use of roads: once through fuel taxes and a second time through congestion charges. This perception may be significant particularly if only some highways are priced while others are free.

- **Privacy issues.** This relates to the perception that collecting data on traveler trips through transponders, cameras, or other means compromises privacy. Although privacy has been raised in opposition to congestion pricing schemes, it is typically not the primary issue of concern.

Establishing Compatibility of Regional Goals with Congestion Pricing Objectives

Closely related to public acceptance issues is the lack of clear understanding by the public, decisionmakers, and planners about the role that pricing strategies play in supporting community goals. There is often limited understanding of how different types of congestion pricing strategies and projects are directly compatible with broad regional planning goals, such as economic development, environmental sustainability, and safety.

Some challenges related to matching pricing strategies to regional goals include:

- **Contradicting views about the goals for a pricing program.** This can occur because the coalition of stakeholders supporting pricing may differ from region to region. In some places, pricing may be driven by environmental advocates and citizens, while in others it may be motivated by business concerns about infrastructure and economic competitiveness.

- **Making the connection between land-use and pricing.** It is important to consider the relationship between pricing programs and regional land development patterns, which influence system demand in particular locations. Congestion pricing may be difficult to consider in areas with dispersed land use patterns that do not support transit since those who find the tolls to be too expensive may not have a viable alternative.

- **Including freight as part of a congestion pricing strategy.** Although most regional models show significant travel time savings and improvements in reliability, freight operators often do not believe there will be enough congestion reduction. Even though

trucking and logistics firms typically have only a small portion of their costs represented by tolls, demonstrating the benefits to these users is often a key challenge.

Interagency Collaboration on Congestion Pricing Programs

Successful congestion pricing projects and integration of pricing into regional transportation plans requires consensus and collaboration among multiple agencies. Different agencies will typically have different areas of focus, including roadways, transit, toll roads, and the environment, and different interests in regard to revenue generation, congestion management, and transit funding and operations. Key challenges associated with interagency collaboration include:

- **Agreement on how to best achieve regional objectives.** It may be difficult for agencies with different interests to agree on how congestion pricing can support regional goals. For instance, one of the objectives of a HOT lane network may be to use any limited excess revenues, if available,⁵ to finance the construction of key bottleneck segments of the network. However, other regional objectives such as air quality improvement and support for transit can work at cross purposes to revenue generation. Transit agencies, air quality and smart growth advocates, and other constituencies typically advocate for free use or reduced tolls for certain vehicle classes such as transit buses, HOV, clean fuel, motorcycles. It may therefore be difficult to reach regional consensus that strikes a balance between competing goals and objectives.

- **Costs and revenue allocation.** In an era of scarce funding for transportation, the allure of a “new” funding source such as roadway pricing is apparent. However, allocation of both the costs of constructing priced facilities and allocation of revenues among jurisdictions, constituencies, and modes (e.g., transit, roadways) can be contentious issues. Similar to a transit network, a network of HOT lanes can provide the user and the region with much greater benefits than the sum of the impacts of individual HOT lane projects. However, agencies often tend to look at the benefits and costs that would result from individual projects within their jurisdiction as opposed to the broader regional view.

▪ **Agreeing on how to manage and operate pricing systems.** In many major metropolitan areas, tolling agencies have operated tolled facilities for many years and have established and operated most of the infrastructure required for roadway pricing facilities. DOTs and transit agencies are becoming increasingly interested and involved in such projects, but have less experience with tolling operations. In order to be most effective, these agencies need to be able to adjust operating policies and technology to adapt to the different business needs of pricing projects. For example, electronic toll collection technology used on a toll bridge may not be adequate for a HOT lane network where there are multiple access/egress points. Since the systems must be regionally interoperable, the agencies must agree upon compatible technology, yet achieving interoperability between new and existing tolling systems operated by different agencies and in different jurisdictions can be a challenge. Moreover, a regional HOT lane network must have some level of consistency in operating hours, tolling strategy, access/egress design, occupancy requirements and other policies in order to make their use relatively seamless to the driver. Pricing projects that cross State lines create additional challenges related to project management, operations, and revenue distribution due to different approaches followed in different States.

▪ **Silos between and within agencies.** Oftentimes, silos within agencies are a barrier to collaboration. Personnel working on highway improvements are typically only in charge of delivering those projects, creating challenges for a variably priced project involving transit and operational improvements in a multimodal strategy. Achieving agreements between MPOs, a State DOT, and transit agencies, all of which may have different goals and objectives, can be a challenge, and everyone needs to be on board with the effort very early on.

There are also cultural differences that exist between and within agencies. MPOs and other local agencies (e.g., transit operators) sometimes work better together than MPOs and DOTs, while in other cases, DOTs and highway or tolling authorities work well together. Within DOTs, there is often a heavy focus on highway infrastructure, engineering planning, project development, whereas there is often a more limited focus on system management and operations.

Analytical Challenges in Evaluating Impacts and Integrating Congestion Pricing into Regional Plans

As regions begin to consider congestion pricing at a broader level as part of transportation plans, there are a number of key issues that need to be addressed to integrate pricing more fully into metropolitan transportation planning. A key challenge is associated with limited modeling capability to analyze congestion pricing impacts accurately. Long-range planning conducted by MPOs relies on travel demand forecasting models, which typically are not well suited to addressing congestion pricing, particularly dynamic pricing approaches where prices vary in real-time based on levels of congestion. This raises challenges in accurately forecasting travel impacts and impacts on emissions for air quality conformity analyses. Forecasting revenues reliably is another important issue for successful project implementation, particularly in projects involving public-private partnerships. In terms of prioritizing projects for funding, existing project selection processes are not designed to “score” congestion pricing projects and programs with respect to attaining various goals.

Specific analytical challenges include:

▪ **Technical capability:** Modeling to analyze congestion pricing programs is complex, with several inherent uncertainties such as how to incorporate changes in travel times and how to predict long-term travel behavior for passengers and freight. Many agencies typically use standard four-step travel demand models, which cannot capture the full effects of pricing programs. The impacts on land use and economic development, as well as potential secondary impacts, are also not typically captured. In many regions, freight is a very important factor (e.g., Chicago), but the models do not accurately capture the impacts of congestion pricing on freight traffic. Impacts on speeds are also sometimes not captured in regional models. Agencies often do not have the staff expertise, modeling capability, or the time to focus on developing new analytical techniques.

▪ **Uncertainties in expected travel behavior changes and elasticities:** Even for agencies that use sophisticated activity-based models, analysis for congestion pricing requires going into relatively new and unfamiliar territory regarding price elasticities and possible diversion onto other roads. For

example, in analyzing the cordon-based congestion pricing proposal for New York City, moving from no charge to a \$8 congestion charge would imply changes in travel behaviors that have never been seen, leading to uncertainties in the values of price elasticities to use. Typically, stated preference surveys where people report how they would behave in hypothetical circumstances (e.g., if a congestion charge were implemented in the future) are used to calibrate travel demand models. But this is not an indicator of how people will actually behave once the program is implemented. In London, for example, higher than expected levels of congestion reduction resulted than the models had shown, leading to lower revenues than anticipated.

- **Conducting robust equity analysis:** In planning for maximum acceptability as well as moving a congestion pricing project along towards the environmental review process, important equity and environmental justice issues typically must be analyzed. Detailed data on user costs and travel patterns for different segments of the population may be required, and this can cause challenges. For instance, in New York City, the potential geographic impacts of the congestion pricing proposal could be analyzed, but income equity impacts were not captured well enough to support the regional plan. Longer-term data collected through longitudinal surveys would be required to determine how travel behaviors change.

- **Collecting detailed data and conducting analysis required to understand local impacts:** Moving from broad, regionally scaled scenario analyses to detailed project level analysis requires even more data and technical capability. For example, it is difficult to document the impact of diversion to streets just outside a pricing cordon or parking impacts in areas on the periphery of the cordon. Even if regional models can handle the issue of traffic diversion between facilities, accounting for shifting travel between time periods is a challenge. Overall, the assumptions for aggregated behavior do not capture the disaggregated decisions individuals make. Detailed analysis at the local level is essential for an environmental impact review, as seen in Seattle, Dallas, San Francisco, and Los Angeles.

Legislative Barriers and Other Implementation Challenges

In addition to the challenges noted above, there are a

number of other challenges MPOs and State DOTs may face with regard to planning and implementing congestion pricing, including:

- **Lack of authority to implement pricing on previously free or federally funded facilities:** Any State seeking authority to implement pricing on free or federally funded facilities must request it by project from the FHWA. Many regions are constrained by State or regional legislation that in some way limits how revenues may be used (e.g., revenues spent within the same corridor where they were generated) or which areas may be tolled (e.g., restricting the ability to convert general purpose lanes or to switch from HOV 2 to HOV 3 occupancies). The California State legislature prohibits changing the minimum occupancy requirements on existing HOV lanes when they are converted to priced lanes (e.g., in L.A.), while other States like Georgia prohibit conversion of general purpose lanes to HOT lanes (e.g., in Atlanta).

- **Limited public and private funding:** In economically uncertain times, regions face a lack of public funds for new pricing projects, and the private sector involvement in public private partnerships may be limited. Further, interest in job creation leads public entities to focus on capacity improvements as opposed to managing existing capacity through the use of congestion pricing.

- **User experience and unfamiliarity with different requirements:** Users may be confused when pricing strategies differ on different corridors in the region. For example, some corridors allow vehicles with three or more occupants (HOV 3+) to travel free on HOT lanes, while others allow vehicles with two or more occupants (HOV 2+) to travel free on priced lanes. In Dallas, efforts are currently underway to work with policy makers to change the minimum occupancy requirement for driving free on managed lanes from HOV 2+ to HOV 3+ while maintaining user support. This is a challenge because some HOV 2+ drivers who previously drove free on the lanes would be required to start paying tolls under the modified policy.

- **Technology issues:** Specific challenges include public perception of the technology, how it works, where it intrudes or doesn't, and interoperability of technology. A region needs to have good technological infrastructure in place to be able to implement pricing programs, and this challenges regions that do not currently have ITS or tolling in place.

4. Effective Practices for Integrating Congestion Pricing Into Metropolitan Transportation Plans

This section highlights effective practices and lessons learned for advancing planning for and implementing congestion pricing in a regional context.

Gaining Acceptance from Decisionmakers and the Public

Successful congestion pricing programs hinge upon gaining acceptance from elected officials and the public. Achieving acceptability requires effective communication with elected officials, travelers, residents, businesses and other stakeholders likely to influence decisionmakers. It also requires understanding and taking public acceptability concerns into account in the design of programs.

Some lessons learned from regional experiences with congestion pricing and tips from practitioners include the following:

Listen to public concerns and goals in the design of congestion pricing proposals. Communication should not be viewed simply as a matter of conveying pricing concepts to “sell” the concept or counter misconceptions; rather it should be considered one part of a broader engagement process between planners, public officials, decisionmakers, affected parties, and stakeholders active in the development of proposals that package pricing with multimodal investment and land-use policies. For instance, income equity impacts depend on how pricing programs are structured (e.g., how revenues are distributed and how non-toll driving options or other alternatives are enhanced). Thus, an open, responsive, and committed process should begin to incorporate these considerations in early planning and to persist through adoption and on to implementation and operation. It may be necessary to

adjust program features and plans to address public reservations; e.g., in Minneapolis, proposed toll rates and time periods were altered in response to widespread public concern.

Communicate the role of congestion pricing in addressing critical problems. Public acceptance can be improved by directly tying the objectives of the congestion pricing

Understanding Public Acceptability

In the *Washington, DC* region, to manage high levels of congestion, a number of congestion pricing projects are currently under development, including HOT lanes in Virginia, a project that has been in operation for a little more than 6 months. In addition, the Metropolitan Washington Council of Governments (MWCOCG) is conducting a public acceptability study for three future pricing scenarios:

1. A variably priced Mileage Based User Fee (MBUF);
2. A variable toll on existing capacity; and
3. A cordon charge.

The MPO is focusing on strategy bundles that combine pricing with other measures not only to reduce congestion and increase reliability but also to raise revenues and improve quality of life.

Source: Presentation by John Swanson, MWCOCG, at FHWA Congestion Pricing Workshop, Washington, DC, September 15, 2011.

program to addressing a severe regional problem such as a funding crisis, severe congestion problems, or sustainability concerns, as a potential long-term solution. Communications should be explicit about the benefits (e.g., improvements in transit, time, mobility, and travel choices) and the value proposition for different stakeholder groups. If possible, for managed lane networks, provide guarantees for travel times or speeds so that travelers perceive the benefit they are paying for and understand that the lanes offer an additional travel choice.

Include congestion pricing in a bundle of strategies aimed at meeting regional goals.

Acceptability of congestion pricing can be enhanced by bundling it with other strategies, such as increased transit service. Some areas have found it beneficial to invest the net revenues from the congestion pricing program in transit and make the case that the transit operations on the facility can be improved along with improving congestion. If some revenues are dedicated to transit, some equity concerns can also be mitigated.

Address equity and fairness concerns directly.

Given the very real concerns about the equity impacts of congestion pricing, explore these issues using data to help inform the discussions. In addition, directly address these concerns through program design; for example:

- Showing data on how sales taxes and gas taxes can be more regressive than congestion pricing.
- Providing multimodal alternatives through improved transit service or incentives to carpool/telecommute. For instance, in the *Dallas* region, transit buses run free on managed lanes and the MPO reimburses vanpools that use the managed lanes.
- Offering tolling discounts. For instance, In

the *San Francisco Bay Area*, the Metropolitan Transportation Commission (MTC) offers toll discounts to low-income travelers. In response to concerns about equity in *Minneapolis/St. Paul*, toll rates were lowered and half of the revenues were directed toward transit enhancements.

Demonstrating Value to the Traveling Public

In the *Twin Cities* region, planners demonstrated that over the next 20 years, the region could build 2-3 large, costly projects and bring a small amount of localized benefit or could build many smaller, geographically dispersed projects with lower cost/higher benefit. This message resonated, especially when the public could see the potential benefits in their neighborhoods. Consequently, the region has 300 miles of bus-only shoulders as part of an overall strategy for managing and operating infrastructure.

The primary focus of congestion pricing in the Twin Cities is congestion and demand management, and pricing has been presented as an additional option for travelers. To maximize benefits while reducing costs, the region uses a Flexible Highway Strategy to maximize the use of existing space without purchasing additional Right of Way (ROW). This approach has garnered support from land use, transit, and livability advocates.

Source: "New Highway Approach: Twin Cities Metropolitan Area," Presentation by Carl Ohrn, Metropolitan Council, at FHWA Congestion Pricing Workshop, September 13, 2011.

To address concerns about geographic equity, strategies may include:

- Adopting a regional approach to pricing and returning revenues to jurisdictions or corridors where revenues are collected.
- Using revenues to benefit those who pay, such as through supporting highway maintenance, implementation of road improvements, or improving public transportation in the corridor.

Attempt short-term pilot and demonstration projects.

Planning, getting support, and implementing congestion pricing can take a long time and proceeds incrementally. However, incremental implementation can help to prepare constituents for subsequent phases of pricing. Introducing congestion pricing to the public as a pilot program can be a success factor for acceptability, as in Los Angeles, where L.A. Metro will complete a pilot run of the Express Lanes and report results to the State legislature after one year of implementation.

Allowing users to try out a new system during a pilot project can help them become more familiar and comfortable with a congestion pricing system and reduce opposition to future expansion. Data from short-term or pilot projects can also be important for combating

performance that decisionmakers and stakeholders can use to understand project results. In areas with existing toll facilities, public perception of the performance of these facilities also significantly influences acceptance for the future, so managing and operating these

systems effectively is important for future expansion.

In the *Seattle* region, all alternatives that were analyzed for the regional plan would use some form of pricing. The regional plan calls for a phased approach, beginning with HOT lanes. The MPO aims to demonstrate success, build

revenues and public acceptability, and then toll the full highway network based on dynamic pricing.

Present data on potential impacts from modeling studies and performance evaluations of existing priced facilities. Using data is important to address

equity concerns and refute misperceptions of impacts. Public opinion can change with information, as seen in San Francisco, where data helped to shape public opinion (see text box example). Polls in San Diego, Los Angeles and Minneapolis/St. Paul showed support for pricing proposals either was higher among low income respondents or unrelated to income, and this “real world” information can help

Mitigating Equity Impacts

L.A. Metro analyzed mode shares by income segment with the help of experts at University of California at Los Angeles and the Environmental Defense Fund and found that the bulk of low-income travelers were already on transit. Funding transit with toll revenues is therefore a way to mitigate equity impacts. On both the I-10 and I-110 projects:

- Tolls are funding BRT station improvements and transit signal priority in downtown L.A. after buses get off express lanes.
- Toll credits will be provided to frequent transit riders.
- L.A. Metro provided a one-time \$25 toll credit to purchase a required transponder to avoid the burden on low income people.

Source: “Metro Express Lanes,” Presentation by Stephanie Wiggins, Los Angeles Metropolitan Transportation Authority, at FHWA Congestion Pricing Workshop, September 15, 2011.

misperceptions and generating support for broader implementation. As an example, on managed lane projects in the *Dallas* region, the Texas DOT provides “Project Tracker” updates on their website on a quarterly basis and one-page information sheets on system

Demonstrating Value Across a Region

Create an expenditure plan that shows benefits for suburbs, central cities, roads, and transit agencies. This is needed to ensure that all partners are brought to the table and see value in the plan. This approach was followed in San Francisco, where a congestion pricing program was estimated to generate \$60 to \$80 million per year. The Metropolitan Transportation Commission (MTC) identified a range of immediate improvements for reinvestment of funds, including BRT in key corridors, signal priority and peak period bus-only lanes, bike lanes in San Francisco, and regional improvements including Bay Area Rapid Transit (BART) station way-finding, access improvements, Caltrans station access improvements, and U.S. Rte 101 corridor management. In addition, on-going benefits, including more frequent rapid/express transit services, street paving/pothole repair, traffic calming, and streetscape improvements were identified.

Source: “Bay Area Regional Express Lanes Network: Understanding the Opportunities and Challenges of Pricing Strategies,” Presentation by David Vautin, Metropolitan Transportation Commission, FHWA Congestion Pricing Workshop, September 13, 2011.

to address public concerns about income equity.⁶ Results from implemented projects demonstrating actual benefits also can be effective in providing information to the public.

Involve decisionmakers from all groups. Finding allies or advocates among decisionmakers can help to build support for congestion pricing programs. Take advantage of the Federal grant programs and partnership agreements available for planning and implementing pricing as this has significantly helped achieve decisionmaker buy-in in several regions. Even in areas that did not receive funding, the act of preparing to apply for the grant helped stakeholders to come together and reduced opposition from decisionmakers. Bring the opposition into the process and make it a bipartisan or non-partisan effort. Develop political champions who can speak on behalf of the initiative to the media and help get other peers on board. Experience from Los Angeles shows that it is important not to be led only by decisionmakers in planning the program, but also to be led by communities, and communities are more interested in transit investments.

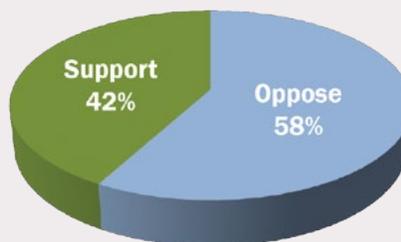
Conduct early and ongoing outreach and communication. Study the issue in focus groups and workshops, engage the public through forums, and provide good information to explain the concept to people using messages that resonate with them. Remind people that prices are more than money; prices are information that help people make decisions. People are currently making decisions based on the misinformation that it is free to drive and park in congested conditions, whereas they are already paying for congestion in other ways. Tailor messages carefully to the interests of stakeholder groups, but avoid being contradictory.

Include local community leaders in project task forces. Community support is important to move a pricing project forward. In Dallas, the argument was made to communities that if a toll road

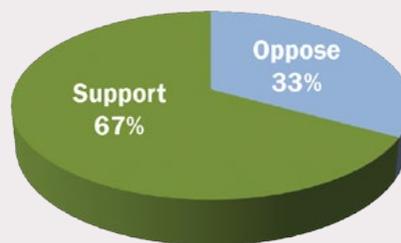
Using Data to Build Support

In San Francisco, through the Mobility, Access, and Pricing Study, the San Francisco County Transportation Authority (SFCTA) was able to collect valuable data and conduct analyses that helped to change public opinion significantly in favor of the congestion pricing proposals. For instance, for the cordon pricing plan, analysis showed that many low-income people would not be impacted, and discounts were planned for those who would be. Data also helped to reduce concerns about geographic equity raised by elected officials and showed that how people valued their own time did not match with planners' perceptions that the value of time correlated with income levels.

Regional Opinion (non-SF) Pre-Presentation
(n=250)



Regional (non-SF) Opinion Post-Presentation
(n=250)



In the *Seattle* and *Minneapolis/St. Paul* regions, attempts to build acceptance focused heavily on elected officials. The strategy was to build high-level support so that the officials could in turn advocate congestion pricing programs to their constituents. This was been called the “grasstops” approach in the Twin Cities. After failed attempts at gaining approval for congestion pricing, a marketing consultant was hired and a value pricing task force was established. This strategy targeted community and political leaders, who could then build more grassroots support.

was built in that community, the revenues will be spent for local improvements. In Los Angeles, net toll revenue has to be invested back into the corridor in which

implemented, is a useful strategy to increase public and decisionmaker acceptance. In Minneapolis-St Paul, elected officials were brought in to talk with other elected officials and in public forums.

In the *Minneapolis/St. Paul region*, the Minnesota DOT set up a Community Task Force at the start of project planning with staff from the MPO, members from the Humphrey Institute at the University of Minnesota, and representatives from six city councils, citizens, State legislators, AAA, trucking association, and transit-oriented groups.

Engage the private and non-government sectors.

Bringing businesses on board to support a congestion pricing project at the early

stages and educating them about planning processes can be important. In many regions, congestion has real costs for businesses in terms of time and productivity. For example, this is a key problem in Southern California; Chicago; Washington, DC; and New York. Using economic development and competitiveness as key regional goals, the private sector can be engaged not just through public-private partnerships on pricing projects but also as planning partners along with universities and other stakeholders.

it was generated, and this policy has helped obtain support from local governments. In the Minneapolis/St. Paul region, too, the State legislature requires revenues to remain in the corridor. These are ways in which community support can be built. In addition, having community leaders participate in project planning alongside elected officials, transportation practitioners, and technical experts or academics by establishing task forces or committees has proven to be a useful strategy in Los Angeles and the Minneapolis/St. Paul region. Such task forces must be set up before commencing any analysis, and the process should be kept transparent to all stakeholders.

In New York City, the NGO and environmental advocacy sectors, along with businesses, worked with the city in a valuable public-private coalition that came about as a result of the pricing proposal. In fact, it was a business group (Partnership for New York City) that highlighted the regional costs of congestion, providing a key impetus for the congestion pricing proposal. In Dallas, the MPO has engaged private businesses and the Dallas-Fort Worth Airport, which speak directly to their constituents in support of the managed lanes projects. Similarly, recognizing the debilitating impacts of congestion in the Southern California region, key business leaders have offered to carry the MPO's message to elected officials that pricing

Engage trusted experts. Bringing in outside experts to present the benefits of congestion pricing, such as from among the university community or from regions where pricing programs have been successfully

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In the *Puget Sound region*, a congruence of stakeholder interests occurred around varied regional goals, all of which could be met by the large-scale regional pricing strategy adopted in the current plan.

- Environmental interests supported congestion reduction and reduction in greenhouse gas emissions;
- Businesses supported congestion reduction and increased reliability;
- Highway lobby supported addition of new capacity and new revenue sources because traditional sources are proving inadequate;
- Transportation engineers and planners supported the goal of congestion reduction; and
- Economists supported the goal of preserving and enhancing economic vitality because incorrect price signals create economic inefficiencies and loss.

Similarly, recognizing the debilitating impacts of congestion in the Southern California region, key business leaders have offered to carry the MPO's message to elected officials that pricing

strategies need to be an important part of the transportation toolbox. In London, a key factor that led to the success of the congestion charging scheme was encouraging businesses to provide employees with incentives to use transit or carpools. All borough employees and bank employees in London were given incentives to encourage them to use alternative modes. It is important to include business representatives on MPO planning and policy boards to help respond to business interests and gain support.

Linking Congestion Pricing to Regional Goals and Objectives

Linking the objectives of congestion pricing with the achievement of regional goals is important to the success of pricing efforts.

Ensure that congestion pricing supports key regional goals. In both Chicago and Seattle, the recently adopted regional plans for the year 2040 include congestion pricing measures as a primary means of managing travel demand and raising revenues for transportation investment. In the Dallas region, NCTCOG similarly showed the huge shortfall in funding to build needed infrastructure; moreover, air quality is an additional important motivation. In the New York metro area, the need to maintain transit in a state of good repair is important, and in Atlanta and the Southern California region, maintaining economic competitiveness is an important objective that has helped to motivate consideration of congestion pricing. It is important to obtain regional consensus on these goals and program objectives. The regional benefits of congestion pricing programs can be enhanced by planning complementary measures. For example, in order to reduce congestion, the Urban Partnership Agreements emphasize “the 4Ts” – tolling, transit, technology, and telecommuting. While pricing may be viewed as a burden on travelers if

Effective strategies to achieve acceptability outlined by practitioners at workshops:

- **San Francisco:** The webpage on “What we heard, what we did”; also, showing local control over expenditures of revenues is key – i.e. demonstrate that funding is not going into a black hole for transit. Show responsiveness to public/political concerns and ability to handle revenues responsibly.
- **Los Angeles:** A peer-reviewed assessment of equity analysis; it was important to people that the MPO set the tolls and used the funds as opposed to the revenues going to the State, which is almost bankrupt. The State legislature prohibited using private funding.
- **Dallas:** The MPO technical committee setting a toll ceiling provided some level of comfort to the public and decisionmakers that there is someone watching and ensuring performance; also, credibility and distrust of government is an issue – both Federal and State governments are distrusted. Most of these facilities span many local jurisdictions, so it helped to show that the MPO will serve as a broad overseer.
 - Assurance that money will stay in the region.

enacted in isolation, when coupled with transit, technology to allow smooth toll collection and real-time transit information, and the ability to telecommute or otherwise reduce trips by carpooling and other means, pricing can play an important role in supporting travel choices, improving reliability, and reducing emissions.

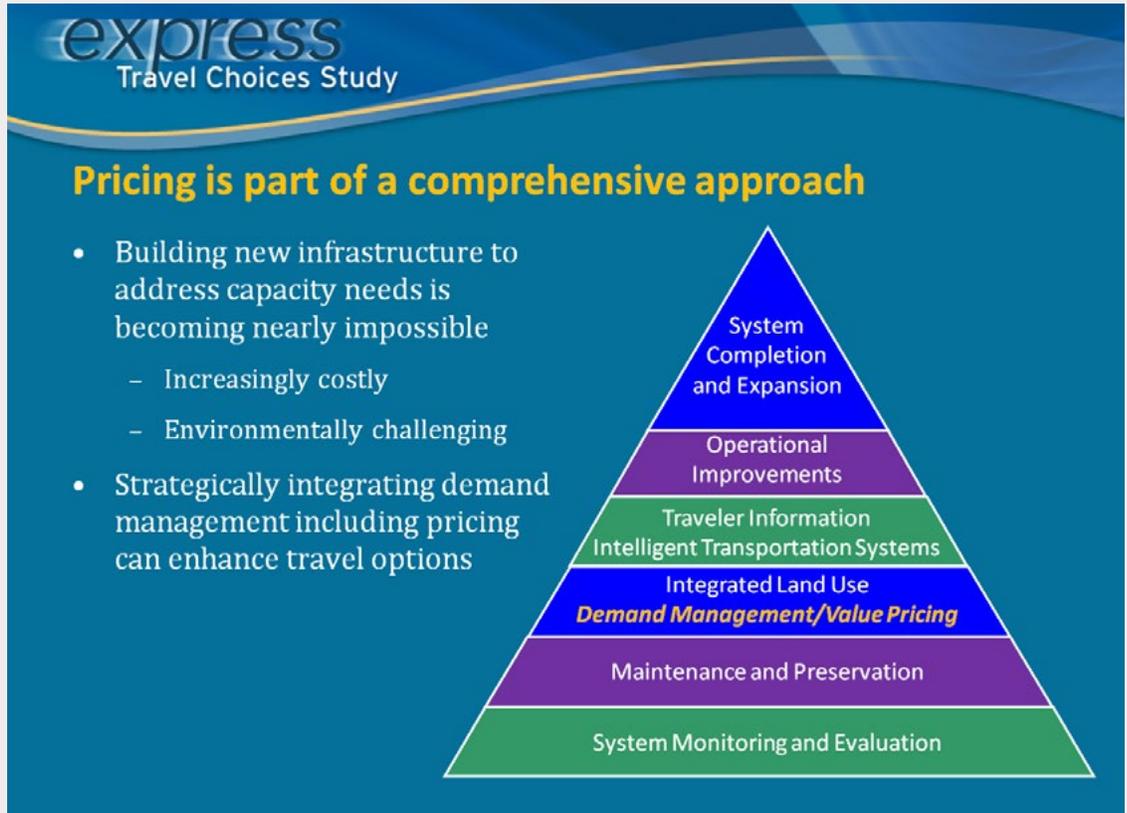
Develop regional operations objectives and appropriate performance measures applicable to pricing strategies. In addition to analyzing projects in the plan, conducting ongoing monitoring and evaluation is important. The goals of a congestion pricing project should be established early in the project and be used to define the metrics of the evaluation program. For example, incorporating performance measures related to reliability, traffic congestion, availability of multimodal choices, revenue generation, and equity can help to raise consideration of pricing strategies as an approach to consider. It can also help in prioritizing congestion pricing projects as part of project investment decisionmaking.

Establishing Regional Partnerships

Partnerships are critical in planning for congestion pricing, given the wide range of agencies and organizations that may play a role in implementation. Effective practices for advancing interagency collaboration include the following:

Congestion Pricing as a Comprehensive Approach to Regional Goals

In the Southern California region, the SCAG is using congestion pricing strategies as part of a comprehensive approach to meeting regional goals.



Source: Image courtesy of Annie Nam, Southern California Association of Governments

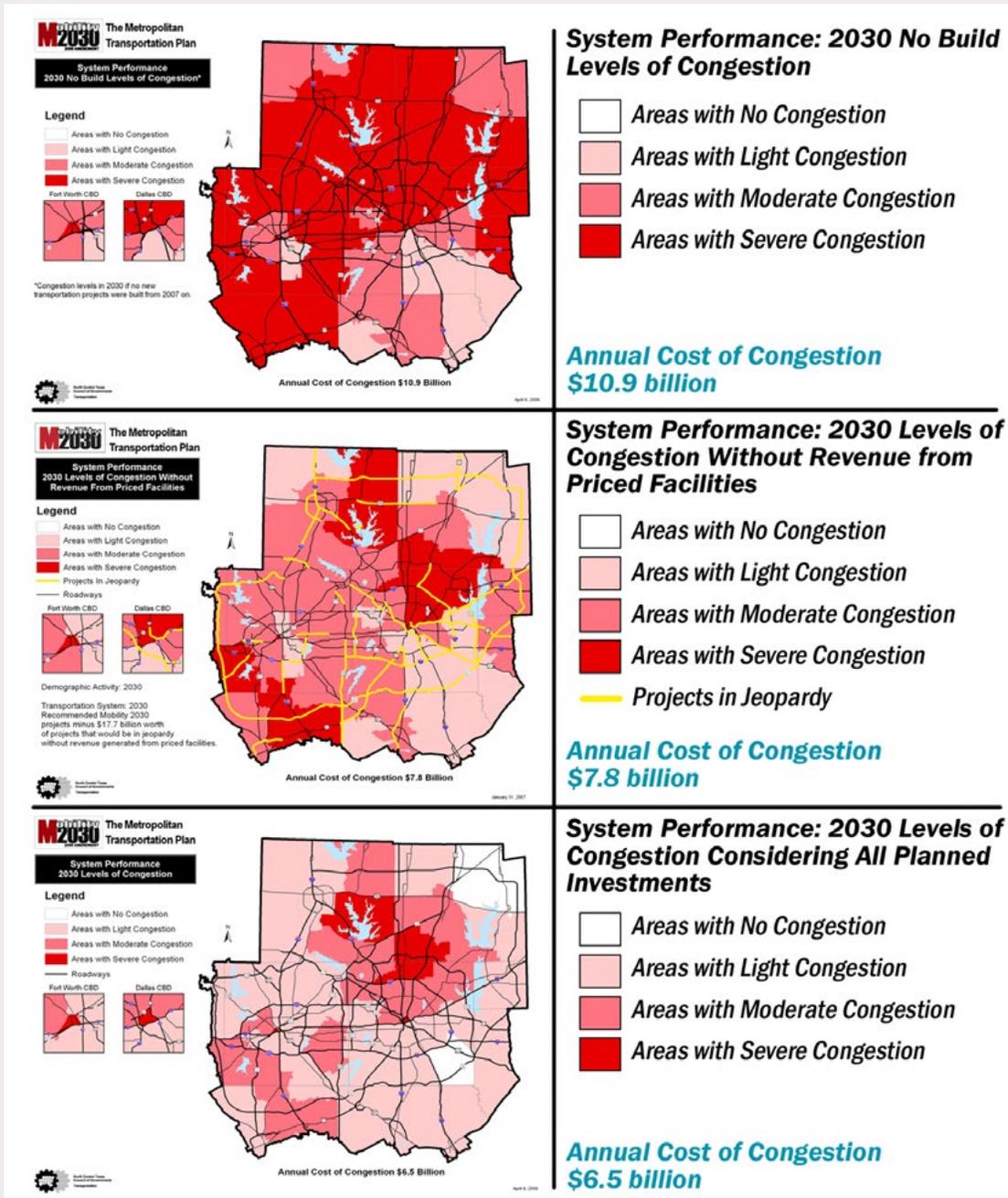
Identify agency roles clearly. It is important to define and understand clearly the roles and requirements of the various agencies that will need to be involved in any pricing arrangement early in the process. Disagreements are occasionally seen at the higher policy levels, but are more common at the level

of planning specific details. When public agencies are not conflicted about their roles and responsibilities and have a strong partnership, they are able to move forward and garner support from other entities such as businesses. Such a partnership has been established in the Dallas-Fort Worth region between the MPO (North Central Texas Council of Governments), transit operators, and the private sector, which fully supports the managed lane projects in the region.

Planning to receive Federal grants for congestion pricing projects facilitated regional collaboration in Los Angeles and Denver, unifying the local governments around common goals and setting the stage for future collaboration. Even though initial proposals were unsuccessful in both regions, the process of applying for the grants created partnerships that were fruitful in obtaining funding under subsequent grants.

Congestion-Related Performance Measures Used in the 2030 Metropolitan Transportation Plan for the Dallas-Fort Worth Region

The North Central Texas Council of Governments used congestion-related performance measures such as travel time, reliability, and the annual cost of congestion to evaluate plan scenarios with and without priced facilities, compared with the baseline No Build scenario.



Source: Images courtesy of Dan Lamers, NCTCOG. Data from the 2030 Metropolitan Transportation Plan.

Draw on the unique strengths and experiences of each agency. Although silos between and within agencies may be hard to eliminate, their various objectives, goals, and strengths can be creatively addressed to achieve collaboration. For instance, MPOs have the capacity and technical staff for planning; transit agencies for providing transit; toll authorities for tolling, and highway patrol for enforcement. If these entities can be brought together in planning a multimodal pricing project, drawing on their strengths and experience in each area, success can be achieved. This has been the experience in the Dallas region, which has the added benefit that the heads of the different agencies have been around for many years, leading to

consistency of purpose. In Seattle, connections between agency staff (not necessarily the highest levels) facilitated collaboration, particularly in planning and analysis.

Often, the MPO is only responsible for long range planning and is not responsible for transit, parking, or toll collection. In these cases, an important role for the MPO is to lead the charge by getting the discussion started, bringing stakeholders to the table, and ensuring that they all have some of their interests met. In the Los Angeles region, L.A. Metro is the regional transportation agency responsible for transit operations and toll collection. This made coordination simpler locally, but the agency had to work with the nationwide MPO that has been working

on its own plans of a managed lane network that crosses county boundaries. L.A. Metro also has Memoranda of Understanding on key aspects with the State DOT.

In the New York metro area, although New York City, not the MPO, proposed cordon pricing, the MPO played an important role. NYMTC was in the process of a conformity determination and integrated congestion pricing into its Transportation Improvement Plan (TIP), making two runs of the model, with and without pricing. The MPO ensured that everything was in line with Federal processes and, as a regional body, facilitated a series of valuable and intense policy discussions.

In Minneapolis/St. Paul, collaboration between the MPO, the

Example of Regional Coordination in Los Angeles

Even though L.A. Metro has authority to implement tolls, responsibility for transit operations, and has been working with the State DOT, the agency has been coordinating across a wide range of agencies to move forward with its pilot HOT L.A.nes. Coordination with Caltrans (California DOT) was required because Caltrans is responsible for the Environmental Impact Review. L.A. Metro also had a Memorandum of Understanding with Caltrans on operations and maintenance of the HOT lanes and funding agreements with the supporting cities. Because of the presence of several state tolling facilities, user agreements were signed with all tolling agencies because of the State's requirements that all facilities be interoperable. It was also important to consider where the revenues would be spent. The revenues from HOT lanes in the L.A. region are to be used for transit improvements in the corridors where they were generated. Extensive outreach with all agencies was required to bring about this coordination of authority.

Regional Roles and Responsibilities in Dallas

In the Dallas-Fort Worth region, the MPO (North Central Texas Council of Governments) must coordinate daily with the separate Dallas and Fort Worth districts, the Texas Turnpike Authority (the regional tolling authority), Texas DOT, and about two hundred local governments. The MPO facilitates collaboration between the agencies, ensuring that "everyone gets a piece of the managed lanes pie." The breakdown of responsibilities in Dallas is as follows:

- Toll collection and analysis – regional toll road authority, Texas Turnpike Authority;
- Enforcement – transit agency; and
- Distribution of revenues (if in excess) – MPO.

A collaborative agreement was worked out so that all agencies have a role in the project; this was the key to achieving inter-agency collaboration in the region.

State DOT, the legislature, and the university helped move the HOT lane projects forward. Minnesota DOT was a leader in innovative highway management technologies and practices, the legislature provided much-needed regional policy support, experts from the University of Minnesota provided thought leadership and technical expertise, and the MPO conducted the analysis and regional planning efforts for managing congestion with a focus on transit improvements and fiscal discipline. Although the region had prior experience with congestion pricing projects, developing relationships between the agencies took time and required a cultural change.

High level political leadership. Ongoing support from a high-level elected official can be important for achieving regional collaboration among agencies. In the Minneapolis/St. Paul region, after the Governor approved the project, interagency collaboration at the

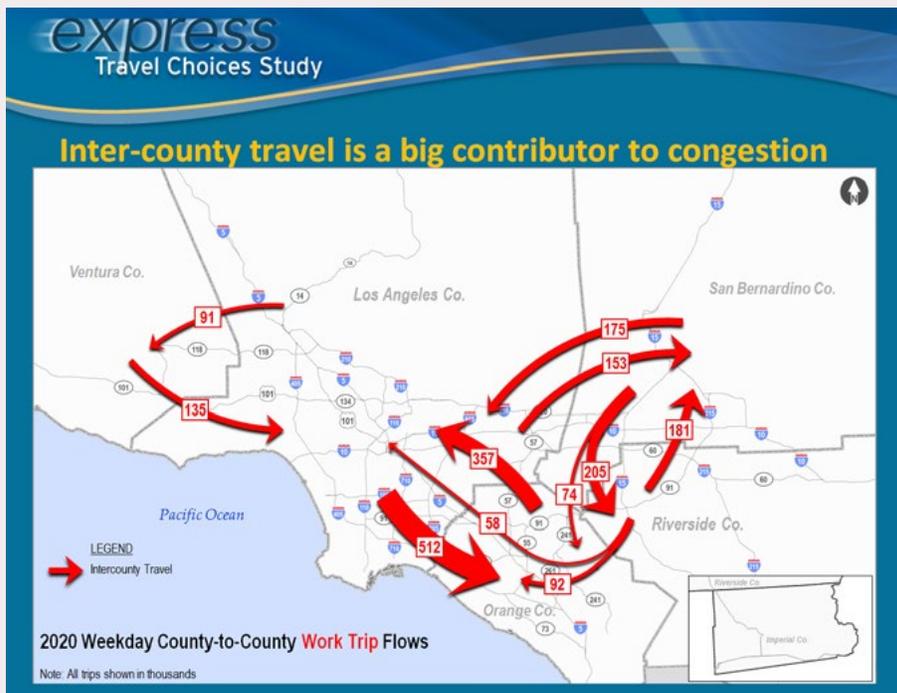
regional level and collaboration with the State patrol has improved dramatically because these agencies often follow the Governor’s lead.

Analyzing Congestion Pricing as Part of the Planning Process

Despite the many analytic challenges associated with addressing congestion pricing in the regional planning process, there are emerging examples of MPOs that have begun to conduct detailed analyses, integrate pricing into their metropolitan transportation plans, and can offer lessons for other regions, such as the Puget Sound Regional Council (PSRC, Seattle), the Metropolitan Council in Minneapolis/St. Paul, the Southern California Association of Governments (SCAG), and North Central Texas Council of Governments (NCTCOG, Dallas). The following are some effective strategies used by these regions.

Southern California Coordination Between Counties

In Southern California, different counties have already embarked on plans for managed lanes. SCAG, as the regional MPO, ensures coordination among the different plans and agencies. Analysis showed that the region has more inter-county trips than intra-county trips, making it essential to look at congestion pricing regionally.



Source: Image courtesy of Annie Nam, Southern California Association of Governments

Update travel models to conduct detailed alternatives analysis and project selection. PSRC (Seattle) updated its travel demand model to analyze a range of pricing alternatives and conducted detailed benefit/cost analyses to determine the best alternative. PSRC conducted a pilot project with Federal funding support to study travel behavior changes under congestion pricing (The Traffic Choices Study) using GPS-based tolling meters in the vehicles of about 275 volunteer households. The project provided valuable data on observed changes in driving patterns in response to experimental tolls charged on major freeways and arterials in the Seattle metropolitan area. These data were fed into PSRC's travel demand model to facilitate better analysis of congestion pricing strategies, following which the model went through an extensive peer review process.

The Metropolitan Council (Minneapolis) also upgraded its four-step model to accommodate evaluation of HOT lanes. San Francisco County has an activity-based model just for the county, but needed to expand it to the nine-county region's employment shed

to accurately analyze impacts. Market research was also conducted separately to understand user travel costs and make adjustments in the model. SCAG recognized limitations in its four-step modeling process and has invested heavily in model improvements and data collection.

Collect data to support good analysis. It is important to be able to answer quickly any questions related to key indicators and impacts in different locations using good data. For example, in San Francisco, when questions were raised about business impacts that could not be answered by the travel demand model, a retail survey was conducted to understand how shoppers shop and what the likely impacts would be. SCAG purchased INRIX speed data and outfitted trucks with GPS systems, spending about \$ 2-3 million on data purchase for two key studies: the Regional Congestion Pricing Study and Goods Movement Study. In Chicago, by establishing a regional coalition, various regional agencies and operators were brought into the process, and they became a rich source of data and information, allowing

San Francisco County Regional Transportation Authority (SFCTA)'s Analysis and Comparison of Scenarios

Scenario Comparison – by the numbers			
	NE Cordon (AM/PM)	NE Cordon (PM, outbound)	Southern Gateway (AM/PM)
Fee analyzed	\$3 am/pm both directions	\$6 pm outbound only	\$3 am/pm both directions
Net Operating Revenue*	\$60 – 80M		
Peak Auto Trips to/from NE Cordon (avg)	-12%	-10%	-5%
Peak Auto Trips to/from S. Corridor (avg)	-4%	-4%	-20%
Improvement in Transit Speeds	up to 20%	up to 20%	up to 15%
Daily Person Trips (NE Cordon)	negligible (less than 0.5% change)		
Daily Vehicle Hours of Delay (NE Cordon)	-21%	-10%	-4%
Daily Vehicle Miles Traveled (San Francisco)	-5%	-3%	-4%
Change in PM _{2.5} Emissions (NE Cordon)	-17%	-11%	-8%
Change in Collisions (NE Cordon)	-12%	-5%	-3%

*Values in 2009\$ for single representative year

www.sfcta.org/sfmobility | twitter.com/SanFranciscoTA | www.facebook.com/sfmobility

Source: San Francisco Mobility, Access, and Pricing Study, San Francisco County Transportation Authority, 2010.

for the creation of a regional data archive to bring together data that was already being collected and that already existed with system operators. This reduced the expenses associated with purchasing data.

Understand revenue generation potential.

Estimating the revenues that will be generated from congestion pricing strategies over the life of the regional plan is important and requires development of appropriate tools to forecast revenues and analysis. It also may require going back and forth from the project-level scale to the regional-level scale. For instance, recognizing that shortfalls in the gas tax will lead to limited funding in future years, NCTCOG (Dallas) has been estimating revenues from multiple HOT lane projects and tolled facilities since the 1990s to demonstrate fiscal constraint in its metropolitan transportation plan. The priced facilities have been adopted in NCTCOG's 2030 Metropolitan Transportation Plan and are expected to fund about 30 percent of the costs for roadway system improvements.

Conduct benefit-cost analysis.

A benefit-cost analysis (BCA) provides a useful framework for analysis and can be very useful to communicate the effects of congestion pricing programs to the public and decisionmakers because it is easily understandable. PSRC relied heavily on BCA as part of the analysis performed to integrate pricing into the regional plan. PSRC has trained economists on their staff who used the travel model outputs as inputs into a BCA tool to compare alternatives against the baseline. The analysis was done for five pricing scenarios with respect to detailed evaluation criteria focusing on mobility and equity. The analysis also

For its Travel Choices Study, SCAG conducted a stated preference survey, receiving 3,500 responses from a six-county region, assessing eight hypothetical pricing scenarios including a regional network of HOT lanes (or “express lanes”), cordon and parking pricing, VMT fees, and full highway facility pricing (toll roads).

focused on zones where equity concerns would be greatest due to high proportions of poor and minority populations. Using this analysis, PSRC staff explained to decisionmakers that geographic equity was being approached in the wrong way; “how much money is being spent in my county?” is the wrong question to ask. Instead, one should look at which groups of users are receiving the benefits and ensure that the most vulnerable user groups are benefitted, regardless of geography. For example, the benefits of travel time savings and improvements in reliability on facilities in King County (Seattle area) extend to users who only work in the area but do not live there. These benefits even create spillover benefits in counties that will not receive many improvements as part of the

San Francisco's Cordon Pricing Analysis

SFCTA conducted a detailed set of analyses involving travel analysis, surveys, and modeling to inform consideration of cordon pricing. The study assessed peak/off-peak reliability and travel time ratios, which are important not just for single occupancy vehicles (SOV) but also for transit, and found that less than a 1 square mile area in the city of San Francisco concentrates trips and jobs. The study considered times of day when congestion occurs and determined that an all-day charge as in London was not necessary; therefore, tolling would occur during peak periods only. The analysis modeled dozens of discrete geographic and time scenarios. Income equity issues also were examined early in the study, and only four percent of low income drivers were determined to travel during peak periods. The study also corrected the perception that the majority of traffic is caused by out-of-city car drivers coming into the city; instead, more than half of the drivers are from the city of San Francisco, which surprised people. Surveys found that people value fare assistance for transit riders more than toll discounts for low income drivers. Finally, SFCTA created a “What We Heard, What We Did” section on website to show responsiveness through analysis, clearing misperceptions, and explanations of how scenario features were revised based on feedback.

Source: San Francisco Mobility, Access, and Pricing Study, San Francisco County Transportation Authority, 2010.

plan. Showing where the money is spent and where the benefits accrue helped in communications with decision-makers in the Seattle region.

Plan ahead and conduct a detailed equity analysis.

Equity impacts must be analyzed and communicated for congestion pricing plans to be acceptable. To do this, it is important to analyze how congestion pricing will impact different segments of the population and different types of trips. Different jurisdictions and regional models must also be able to do income-stratified trip generation and distribution. The NCTCOG (Dallas) is conducting a detailed equity analysis and

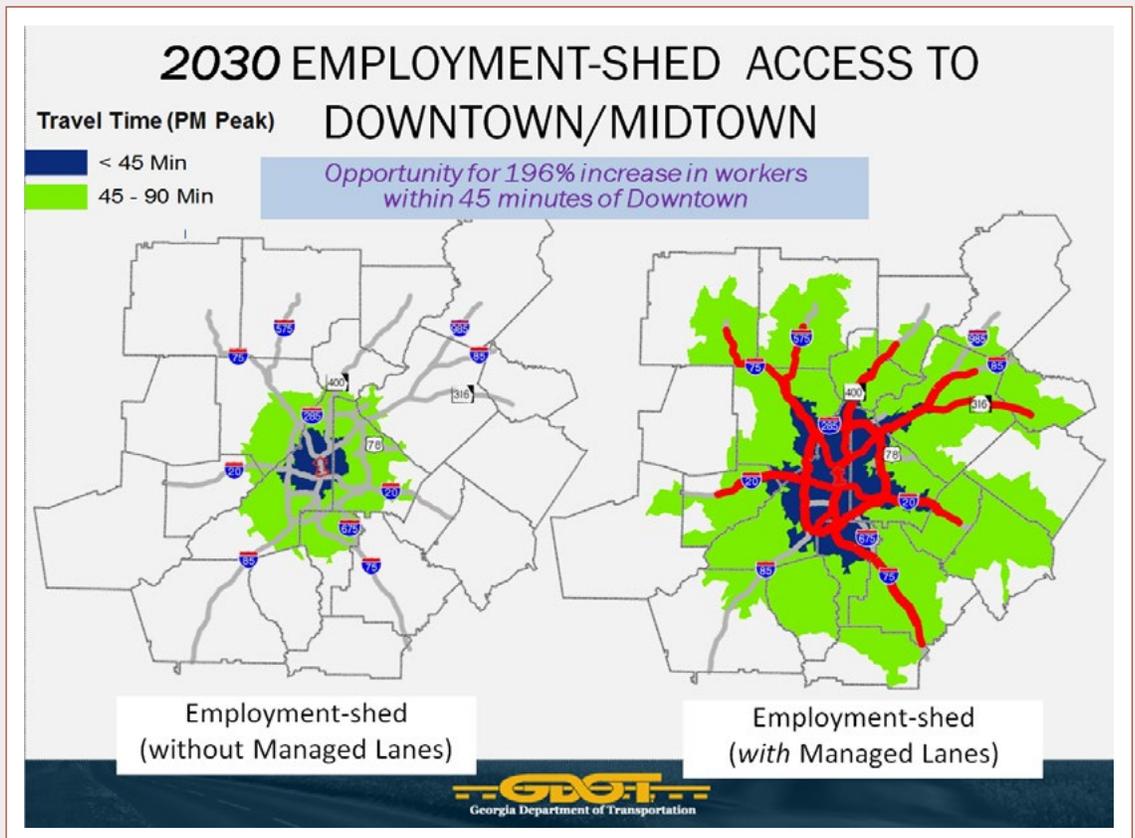
research on the economic impacts of pricing projects. It is evaluating systemwide trip lengths and tolls to ensure there are no negative impacts. NCTCOG is performing this evaluation because:

- NEPA documents cannot be prepared without some equity analysis;
- Acquiring right-of-way has equity implications as it can lead to displacements and job losses, so an analysis showing the extent of these potential negative impacts must be done;

Atlanta’s Analysis of Economic Impacts from Congestion Pricing

An analysis of economic impacts from implementing congestion pricing in Atlanta using a benefits approach:

- Showed maps of the employment shed in the region (distance in which employees could travel in a certain time period to access jobs) in 2030 with and without a managed lane network. The analysis showed that the increased access provided by the managed lanes in connecting employees to employers would lead to a tripling of worker accessibility (196 percent increase).
- Showed that an 8 percent reduction in delay saves significant costs over 35 years.



Source: Image courtesy of Matt Fowler, Georgia Department of Transportation

- Environmental review also requires documentation on what the expected toll rate might be for a certain demographic group; an answer based on analysis must be available in the event of a legal challenge; and
- It is important to consider what analyses can be performed in the planning stages such that the process does not have to be revisited during environmental review.

Gaining and Sustaining Support from Users and Decisionmakers

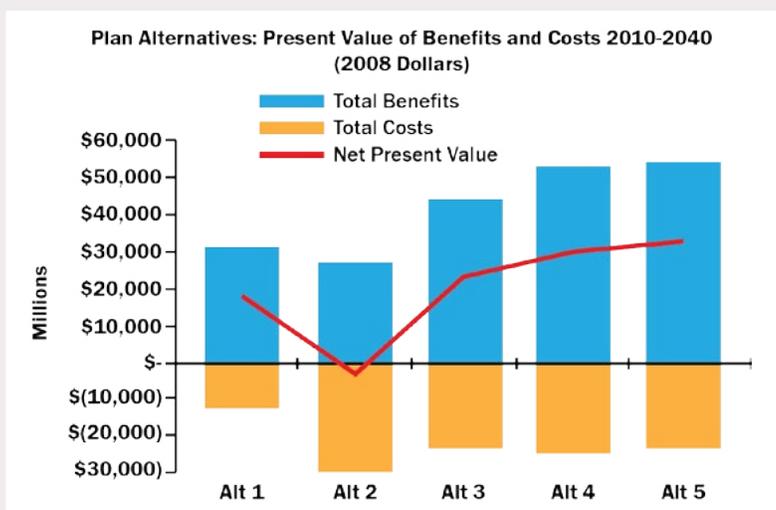
Finally, it is important to gain support from users and decisionmakers to facilitate planning for and implementation of congestion pricing. Some key approaches for establishing the necessary policy foundation and authority for congestion pricing, as well as effective implementation, are noted below.

Benefit-Cost Analysis in the Seattle Region

PSRC relied on benefit-cost analysis as (BCA) part of the analysis performed to integrate pricing into the regional plan. Key features of the analysis are described below.

- Trip purposes were integrated with individual out-of-pocket costs to determine values of time for different income groups in terms of time savings and reliability benefits.
- Having incorporated user costs into the model, system optimization was assessed based on price on every time period and every link, assuming all users were traveling the way they wanted to. This analysis was used to set appropriate toll rates.
- Minimizing diversion to arterials was the objective for freeway pricing.
- Parking pricing involved a 20 percent surcharge in congested times and a 5 percent surcharge at other times. The toll rates resulting from this optimization process were checked for reasonableness. Depending on the facility, the result was a toll of 30-50 cents per mile.

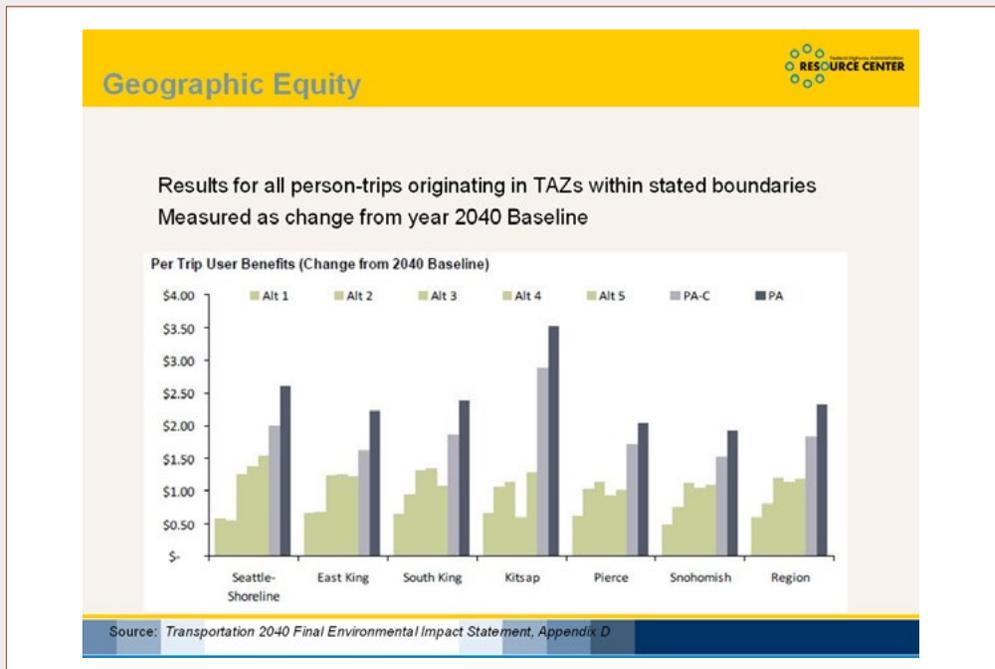
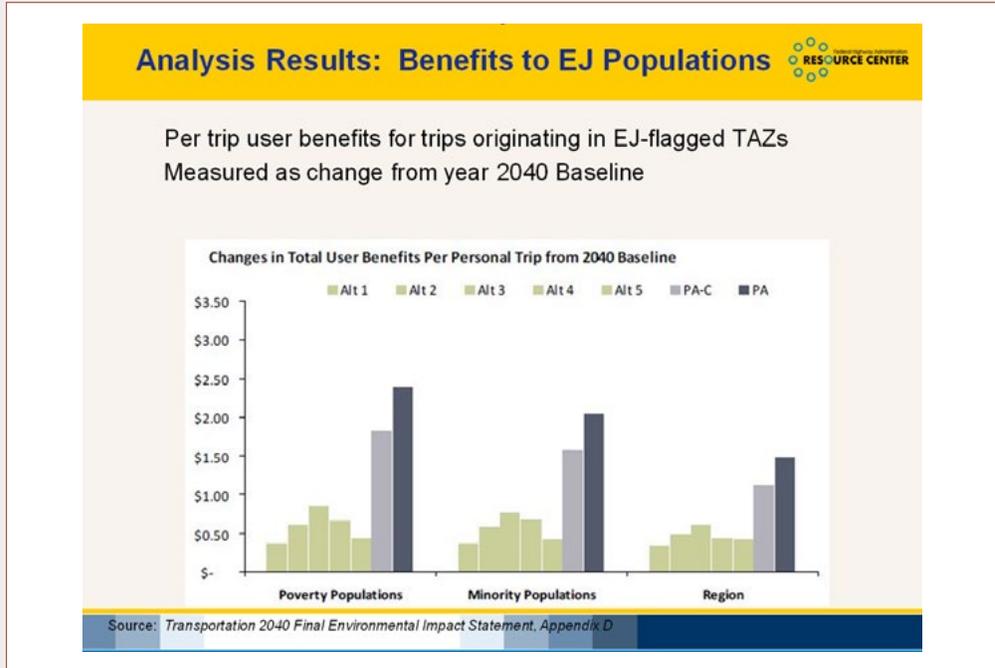
As one of its scenarios in the 2040 plan, the Puget Sound region’s MPO analyzed the alternative of pricing all freeways and arterials (Alternative 5 below), which would prevent problems of traffic diversion from priced roads to other free roads. Although it is difficult to gain public acceptance for a comprehensive approach that involves pricing previously free lanes, the benefit-cost analysis showed that this option would be the most economically efficient, raise the most revenues, and result in the maximum reduction of congestion and emissions.



Source: Matthew Kitchen, Puget Sound Regional Council

Seattle MPO Analysis of EJ Impacts

Analysis of Equity impacts on Environmental Justice Populations by PSRC:



Source: Puget Sound Regional Council Transportation 2040 Final Environmental Impact Statement

Technical Evaluation Criteria used in PSRC Regional Plan Analysis

The Puget Sound Regional Council established a detailed framework of performance metrics to evaluate scenarios of the regional plan that included different types of congestion pricing strategies. The performance metrics were categorized as below.

Technical Evaluation Criteria

Mobility (M)

1. Travel Time Savings
2. Reliability Benefits
3. Vehicle Operating Cost Savings
4. Other User Costs

Economic Prosperity (EP)

1. Accessibility to Living-Wage and High-Wage Employment
2. Accessibility to Cluster Employment (15)
3. Accessibility to Freight Generators

Finance (F)

1. Facility Operating Costs
2. Capital Costs
3. Operating Revenues
4. Influence of Finance on the Economy

Environmental Stewardship (ES)

1. Vehicle Emission Cost Savings
2. Runoff From Impervious Surfaces
3. Ability to Retain Open Space

Growth Management (GM)

1. Population in Regional Geographies
2. Employment in Regional Geographies
3. Jobs and Housing Balance in Counties
4. Population and Jobs in Regional Growth Centers and Jobs in MICs

Quality of Life (QL)

1. Accident Cost Savings
2. Non-Motorized Travel
3. Redundancy

Equity (E)

1. Geographic Equity
2. Income Equity
3. Distribution of Benefits to Passenger and Freight Users
4. Special Needs and EJ Population Equity

Source: Puget Sound Regional Council Transportation 2040 Final Environmental Impact Statement

Establish a policy framework for implementing pricing and involving the private sector. One key mechanism for advancing pricing is to create a policy framework that requires consideration of pricing as part of new projects – e.g., NCTCOG (Dallas) established a key, three-step policy emphasizing that any additional capacity necessary in the region will be tolled, if warranted, to raise funds for regional capacity needs. The policy stipulates that: (i) all new limited-

to cap toll rates, as was done in Dallas, where this allowed the MPO to achieve public support for public-private partnerships (PPP). The MPO also included performance standards in these agreements (e.g., guaranteed speeds on the HOT lanes). But although a price ceiling garners public support, it is best to leave the policy flexible for accommodating any future adjustments because changing a legislatively established price cap may be challenging. In Orange

In *San Francisco County*, to improve public confidence, local control of funding with an expenditure plan or “lock box” tied to it has helped. The public can vote on what the funding should be used for.

County (Los Angeles), on the SR 91 Express lanes, the price cap can be increased after a public hearing and only under certain conditions, like

access facilities have to be tested for tolling feasibility and built as toll roads, if warranted; (ii) when existing freeways are reconstructed, the feasibility of tolled express lanes should be tested and these should be built, if warranted; and (iii) free lanes or gas tax lanes will not be converted to toll lanes. Moreover, the MPO has had support from the State legislature since the 1990s, with a framework for regional revenue sharing and other policies created even before the first facility was constructed. Another useful mechanism is establishing guidelines for public-private partnerships; e.g., in Virginia, the State’s Public-Private Transportation Act enables it to work with the private sector to bring forward transportation improvements.

increased congestion levels or other parameters.

Establish a revenue use policy. It is a good practice to set policy that establishes how the revenue will be used in advance of implementation of a congestion pricing system; i.e., whether the excess revenue will be used to fund capital costs for transit or operations and maintenance expenses for facilities. In Minneapolis/St. Paul, the capital costs of the project had to be paid back first; only then could excess revenue be used to pay back the operations and maintenance costs of the HOT lanes, and finally any remaining revenue would be spent on transit service. In Dallas, the excess revenue policy requires that all revenue

In *Minneapolis/St. Paul*, the MPO is managing congestion by “tweaking” the system, including several low cost/high benefit projects in the fiscally constrained regional plan. Five BRT projects are proposed by 2020, with 300 miles of bus-only shoulder lanes having a 35-mph speed limit to be used as priced lanes. Although the congestion pricing revenues are expected to provide some funding for transit, it is recognized that the revenues will not be large. By fully utilizing the existing right-of-way pavement capacity for the priced lanes, the MPO is able to keep project capital costs low and use a more significant portion of the revenues to cover costs.

go to operations and maintenance of the managed lanes; anything beyond that goes to the public agencies that invested in upfront capital costs, allowing transit agencies and Texas DOT to share revenues.

Set price caps when private tolling authorities or the private sector are involved. While mistrust of toll authorities can be a barrier, public entities can establish agreements with the private operators

Familiarize the public with the technologies and integrate systems. Focusing on operational issues like helping users understand occupancy requirements and how to pay tolls has an important pay off. The

experience for the public should be seamless, otherwise the many kinds of lanes and facilities (HOV lanes, HOT lanes, managed lanes, fully tolled facilities) can be confusing. This is an issue when transitioning between corridors with different vehicle occupancy requirements – e.g., from a HOV 2+ occupancy requirement for driving free of charge, to HOV 3+ and then back to HOV 2+ in the same trip. As far as possible, occupancy requirements and technologies must be unified across the system. One way to help the public become familiar with the system is to set up a mobile customer service and information center that allows people to operate a sample transponder, view system maps, become comfortable with the technology, and then decide if they would like to become HOT lane users.

Develop mechanisms to enforce occupancy requirements on HOT lanes. The L.A. HOT lane demonstration project on the I-110 corridor has a HOV 2+ requirement for driving free of charge that changes to HOV 3+ in peak hours. This makes enforcement challenging. A technological solution for this in L.A. is that travelers can specify the number of occupants on their in-vehicle transponder when they start a trip through a switch on the

transponder that indicates whether the driver has one, two, or three additional persons in the car. This allows deduction of the appropriate charge as the vehicle moves between corridors with different occupancy requirements. All users in L.A. are required to have a transponder. In Dallas, travelers will be required to self-declare vehicle occupancy.

Carefully consider how to set toll rates. The public values toll reliability. People will be more likely to use priced facilities if they know what the rate will be before travel. Regions can provide a pre-payment option so that users are able to look up the rates online before starting their trip and lock in the rates by pre-paying. In some regions like Denver, to obtain support from transit operators and create an incentive to shift to transit, the peak of the peak toll rate is kept equal to or higher than the transit fare. Similarly, in Los Angeles, the toll rate has to be 1.5 times higher than the express bus fare on the express lanes.

5. Getting Started

Developing comprehensive regional congestion pricing plans cannot happen overnight and requires considerable effort to gain public and decisionmaker acceptance, develop interagency partnerships, and address other challenges. Fortunately, there are many smaller steps that planners, policymakers, and others can take to start this process.

- **Understand where and what types of congestion pricing strategies make sense.** First and foremost, it is important to understand what kinds of congestion pricing strategies will be effective in addressing regional needs and how these strategies can support regional goals. While tolling is often used as a revenue-generating mechanism, congestion pricing works best on corridors, bridges, tunnels, and networks that are severely congested and where a pricing signal can help to shift traffic to alternative modes, times of day, or facilities, or where the public desires a faster travel option. Pricing strategies should be explored with these effects in mind. Congestion pricing could be applied as one component of a broader regional pricing strategy to support investment needs. As a first step, planners can identify what characteristics make congestion pricing feasible in a particular corridor.

- **Begin to educate and inform the public and stakeholders about congestion pricing.** Before rolling out alternative strategy proposals, it is important to inform the public about the potential for pricing. This may be a process that involves many steps over time, including meeting forums with key decisionmakers, the business community, and other stakeholders. For instance, in 2003, in the Washington, DC metro area, the MWCOG held its first congestion pricing forum and created a Value Pricing Task Force. Over time, as the region and elected officials have become more

comfortable with pricing, project implementation and broader consideration at a regional level are moving forward. For the public, it is important to communicate that the real value of the gas tax has been falling, since it is not indexed to inflation. For elected officials, it can be very beneficial to speak to elected officials in other regions that have implemented congestion pricing and to learn about projects and plans that have been implemented there.

- **Take small steps.** Look for ways to take incremental steps and to leverage congestion pricing as a “win-win” solution. An underutilized HOV lane, for instance, could be a good option to consider for conversion to a HOT lane. Support for projects established in this incremental way can lead to broader acceptance of congestion pricing on the roadway network. For instance, the Minneapolis/St. Paul region has accomplished their managed lanes projects through incremental steps: the legislature allowed the MPO to operate bus-only shoulders in collaboration with transit agencies, the DOT, and FTA until initial safety concerns were demonstrated not to be an issue in practice, which opened the door to congestion pricing in the form of priced dynamic shoulder lanes.

- **Explore scenarios.** An initial way to start a regional conversation may be by looking at congestion pricing as one scenario within a scenario planning process. By exploring the potential benefits of congestion pricing, decisionmakers can understand the potential impacts on revenues, system performance, and the environment within a neutral context. The congestion pricing scenario may not be selected, but it can help to further a regional conversation about how to move toward congestion pricing on a regional scale. As part of the federally required Congestion

Management Process (CMP) in metropolitan areas with populations greater than 200,000, congestion pricing may be considered one part of a toolbox of strategies to manage congestion. In that context, congestion pricing can be explored in combination with a range of strategies on a corridor and regional basis.

Overall, it is important to recognize that congestion pricing is a change in paradigm for many, and that an incremental approach will likely be needed. Planners and their stakeholders should be prepared to learn over time, gain additional data and information, and plan for change as they go through planning update cycles.

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Appendix

1. The Use of Congestion Pricing To Address Regional Goals

The table below highlights the regional goals that were discussed at the workshops, for which congestion pricing is being considered in a wide range of regions.

Region Represented at Workshops	Goals for which Congestion Pricing is being Applied
Seattle, WA	<ul style="list-style-type: none"> • Congestion relief • Reduction in emissions and vehicle miles traveled (VMT) • Economic efficiency • Revenue generation
Minneapolis/Saint Paul, MN	<ul style="list-style-type: none"> • Better utilization of HOV lanes by conversion to HOT lanes • Need to maintain transit's advantage by enhancing transit service • Revenue generation
San Francisco County, CA	<ul style="list-style-type: none"> • Achieving a more balanced transportation system with greater use of transit, particularly outside the city • Revenue generation • Considering peak period cordon pricing as opposed to managed lanes because HOV lanes are all outside the city and gridded road network in the city meant strong potential for diversion to other arterials. • Reduction in greenhouse gas emissions (part of Climate Action Plan)
San Francisco Bay Area MPO (MTC), CA	<ul style="list-style-type: none"> • Congestion reduction • Reduction in greenhouse gas emissions
Dallas, TX	<ul style="list-style-type: none"> • Improvement in air quality • Congestion management while maintaining fiscal constraint, leading to use of PPPs to fund managed lane projects • Need to raise funds for maintenance
Los Angeles and Southern California, CA (SCAG and L.A. Metro)	<ul style="list-style-type: none"> • Congestion reduction to improve economic competitiveness • Revenue generation is a secondary goal
Hampton Roads, VA	<ul style="list-style-type: none"> • Manage congestion and move it outside of peak periods • Revenue generation
New York City, NY	<ul style="list-style-type: none"> • Congestion management • Funding to maintain transit in state of good repair • Urban livability and sustainability
Washington, D.C.	<ul style="list-style-type: none"> • Congestion management through pricing of new and/or existing lanes • Focused/concentrated growth in activity centers and around transit stations • Revenue for transit and financing for new highway capacity
Orlando, FL	<ul style="list-style-type: none"> • Expand capacity in a financially viable way

Region Represented at Workshops	Goals for which Congestion Pricing is being Applied
Kansas City, KS	<ul style="list-style-type: none"> • No severe congestion yet, but need to plan for expected growth and shortfalls in revenues
Phoenix, AZ	<ul style="list-style-type: none"> • Aggressive highway building to keep up with growth has helped manage congestion, but considering congestion pricing in the medium term for system management.
Atlanta, GA	<ul style="list-style-type: none"> • Congestion management, while ensuring that the project is financially possible, therefore using a public private partnership for project delivery • Increased access to jobs by improving travel times and connectivity
Chicago, IL	<ul style="list-style-type: none"> • Raise money in a strategic way to raise transportation system performance • Reduction of travel delays and improvement in reliability

2. Agenda for the Workshops

The Role of Congestion Pricing in Supporting Funding and Regional Goals:

Integrating Pricing in Metropolitan Transportation Plans

As metropolitan planning organizations (MPOs) and their planning partners in State Departments of Transportation (DOTs), transit agencies, and local governments work together to develop metropolitan transportation plans, many agencies are looking for innovative approaches to address funding needs and to advance regional goals, including livability and environmental quality. The workshops will help participants:

- Explore the potential role of congestion pricing in supporting funding needs, livability, and other regional goals;
- Identify what pricing approaches may be effective in different settings and in combination with different transportation investment strategies;
- Learn lessons on effective approaches for integrating congestion pricing into regional planning, including approaches for advancing public acceptance of these strategies.

Agenda

Time	Session
8:30 AM	Registration Sign-in / Coffee
9:00 AM	Welcome and Introductions
9:20 AM	Why Consider Pricing as part of Metropolitan Transportation Planning?
10:30 AM	Break
10:45 AM	Pricing in Support of Regional Goals and Addressing Transportation Challenges
11:30 AM	Integrating Congestion Pricing into Metropolitan Transportation Planning
12:00 PM	Lunch - Challenges to Implementing Congestion Pricing
1:00 PM	Public / Decisionmaker Acceptance and Equity Issues
1:45 PM	Interagency Collaboration: Developing Agreement on Pricing Objectives and Structure
2:30 PM	Break
2:45 PM	Analytical / Process Issues in Integration of Pricing in Metropolitan Planning
3:30 PM	Integrating Pricing into Metropolitan Transportation Plans: Steps for Getting Started
4:30 PM	Moving forward / Closing Remarks
4:45 PM	Adjourn

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