Parking Demand Management and Pricing

What is it?
Parking demand management strategies include a number of policies and programs designed to reduce parking demand, preserve parking for certain trip types and users, and promote a shift from single occupant vehicle (SOV) trips to transit, pedestrian, and bicycling trips. Parking demand management includes both parking pricing and supply-side strategies. Parking pricing involves charging a fee for parking, whereas parking supply strategies involve restricting the supply of available parking to achieve a desired outcome. Example programs for each strategy type are described below.

Pricing Parking
- Introducing or raising parking fees in areas of high parking demand such as a central business district (CBD), employment areas, and retail centers
- Introducing or raising parking fees during times of high parking demand (flat-rate premiums during peak hours or dynamic, performance-based pricing responsive to real-time occupancy levels)
- Designing parking fees to discourage long-term parking and promote parking turnover (to prioritize parking for shopping district customers rather than employees)
- Implementing a downtown employee parking payroll tax
- Unbundling (requiring the separate pricing of residential parking from the rent or sale price of a home or building)

Parking Supply
- Parking maximums and area supply management
- Residential parking permit programs
- Parking time limits (2-hour maximum parking)
- Shared parking strategies
- Preferential parking for carpools/vanpools or alternatively fueled vehicles

Both pricing and supply strategies have been used by local jurisdictions to manage parking demand, intensify land uses, and create an incentive for travel by more sustainable transportation modes.

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1 Photo courtesy of CH2M HILL.
2 http://olympiawa.gov/.
Parking price and availability is of significant importance to travelers making travel decisions and can affect such diverse decisions as mode choice, trip destination choice, and trip frequency.\(^3\)

**What are the benefits?**

- **Funding/Financing:** Generates operating revenues for local transportation or other infrastructure improvements.

- **Mobility:** Encourages turnover of parking spaces in areas with high parking demand, improving travel time reliability for drivers. Also encourages mode shift to transit (where available), cycling, or walking which can help reduce congestion and vehicle miles traveled (VMT).

- **Environmental:** Reduces the emission of criteria air pollutants and greenhouse gas emissions (GHGs) that are harmful to the environment and human health by encouraging shifts to more sustainable transportation modes.

**Where is it being used?**

Parking pricing is widespread in cities internationally and throughout the United States. Examples on the Pacific coast include:\(^5\)

- Portland, OR
- Eugene, OR
- Olympia, WA
- San Francisco, CA (largest performance parking program in the world)

**How effective is it?**

The following are findings related to the effectiveness of parking demand management strategies:

- For every 1% increase in parking price, parking demand will typically decrease by 0.1% to 0.6% (with 0.3% being the most frequently cited value).\(^6\)

- In general, the user cost of parking has a larger impact on SOV mode share, than the available supply or allowed time limit of parking. A highly-correlated inverse relationship \((r = -0.88)\) exists between increasing on-street meter charges and decreasing SOV use, with similar effects observed for off-street parking monthly rates and daily charges.\(^7\), \(^8\)

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\(^4\) Photo courtesy of CH2M HILL.

\(^5\) In this summary, the best available data on program effectiveness is used. Whenever possible, information is provided for the referenced examples; however, that information was not always available.


\(^8\) Correlation coefficients — indicated by the symbol \("r\) — are measures of the strength of relationship between two variables, and should not be construed as elasticities. They range from 0 to 1 or -1. The closer to 1 or -1, the stronger the relationship, which is inverse if the \(r\) is negative.
• The relationship of decreasing on-street parking supply and time limits to decreasing SOV mode share is generally more modest. SOV use increases with the number of on-street parking spaces per 1,000 central business district (CBD) employees ($r = 0.23$), though the effect is not as strong for off-street parking supply ($r = 0.40$). Additionally, where the maximum time limit for on-street parking is less restrictive, SOV use is higher ($r = 0.20$).\(^9\)

• According to the OSTI Greenhouse Gas Toolkit, parking pricing could result in a 0.8% to 1.8% reduction in total transportation sector baseline GHG emissions in 2030, depending on the pricing level. Because the reduction in greenhouse gases would be derived entirely from a decrease in VMT, a 1:1 ratio of percent GHG reduction to percent VMT reduction can be assumed.\(^10\)

• Overall, parking prices are most effective at reducing parking demand when the changes primarily affect commuters or lower-income populations, and when high-quality transit alternatives to SOV use are available in conjunction with supportive land-use patterns.\(^11\) The equity issue that emerges from this finding (i.e., that lower-income populations are more sensitive to price changes) is common to all pricing programs and should be carefully considered prior to implementation. Strategies to reinvest revenues in the communities affected may help to alleviate concerns.

• Parking price increases directed at commuter parking (off-street parking fee surcharges or on-street parking fees for non-residents in residential areas) in the range of $1.00 to $2.00 per day, have been found to reduce long-term parking by approximately 20% to 50%.\(^12\)

• In a study by Donald Shoup, 30% of the drivers of cars in 16 congested downtown traffic areas (1927 to 2001) were found to be cruising for parking, which can cause increased congestion and air pollution. The study recommends setting fair market prices for curbside parking to eliminate cruising.\(^13\)

• A smart parking system outside San Francisco, California, allowed drivers to reserve parking spaces at a BART transit station, either pre-trip or en route, with space availability displayed on roadside dynamic message signs. Surveys showed that the enhancements led to a sizable increase in transit mode share (5.5 more transit commutes per month), a decrease in average commute time (an average of 5% for a 50-minute commute), and a reduction in total vehicle miles traveled per participant of 9.7 miles per month.\(^14\)

\(^10\) While GHG reductions are different than VMT reductions, a 1:1 ratio of percentage of GHG reduction to percentage of VMT reduction is assumed for the programs that derive GHG reductions entirely from reducing VMT (such as parking pricing). This assumption is consistent with assumptions in the OSTI GHG Toolkit source document, Moving Cooler. Appendix B. p. B-7.
How much does it cost to implement?

The expenses to operate a parking program include capital or up-front planning and implementation costs, ongoing administrative and operating costs, and enforcement costs, where applicable. Because parking demand is only somewhat decreased in response to price increases, parking fees are generally met with an increase in total revenue, though less than proportionate to the fee change.\(^\text{15}\) If parking demand management programs result in travel behavior changes that address broader policy objectives, such as VMT reduction (and correspondingly, traffic congestion or air pollution), the benefits will enhance the cost effectiveness of the program.\(^\text{16}\)

More elaborate parking pricing programs may require greater economies of scale to operate without subsidies. In Oakland, California, operating revenue earned in a smart parking system at BART stations was found to be insufficient to recover total system costs unless the scale of the deployment was much larger (greater than 50 spaces per station). Included in the total capital cost of $205,000 to implement the system were two roadside dynamic messaging signs, an integrated web-based reservation system, and interactive voice response support.\(^\text{17}\)

Implementation resources

The following resources can assist jurisdictions that wish to implement parking demand management programs:

- **Parking Pricing Implementation Guidelines** – Victoria Transport Policy Institute (2011)
- **Contemporary Approaches to Parking Pricing: A Primer** – Federal Highway Administration (2012)
- **Dynamic Parking Pricing Manual**, Florida Department of Transportation (2001)

