Parking Management: Key Stakeholder Messages

5 March 2019
Todd Litman
Victoria Transport Policy Institute

Key Messages

- Parking policies and planning decisions have diverse economic, social and environmental impacts, *which are often overlooked* in policy analysis. More comprehensive analysis tends to support more efficient parking management.

Economic	Social	Environmental
• Development costs • Traffic and parking congestion • Road and parking infrastructure costs • Land use development efficiency • Stormwater management costs	• Housing affordability • Traffic safety • Public fitness and health • Accessibility for non-drivers • Inequitable cost burdens	• Vehicle emissions • Impervious surface area – reduced groundwater recharge • Habitat displacement • Streetscape design – urban beauty

- Many current parking policies, reflecting the *old* parking paradigm, such as high minimum parking requirements in zoning codes and under-priced on-street parking, contradict strategic planning objectives to reduce traffic congestion, accidents, pollution emissions and habitat loss, increase affordability, improve public fitness and health, and encourage more compact development. Conversely, policies reflecting the *new* parking paradigm, such as reduced parking requirements and more efficient parking management, tend to support strategic planning objectives.
- Most people never purchase a parking space as a separate item: parking is usually bundled with building space, or owned by governments, so most have no idea what they cost. An urban parking space typically costs £10,000-40,000 to construct, plus land, operating and environmental costs, and in most cities there are 2-6 parking spaces per vehicle. *For every Euro a motorist spends on their car, somebody – users, employers, local governments and businesses – spend more than a Euro to provide parking for it.*
- Current parking policies tend to subsidize automobile ownership and use, which is *inefficient, unfair and regressive*. Cost-recovery parking fees (charging motorists for the costs of the parking facilities they use) typically *reduce vehicle trips by 10-30%*, indicating that parking policy distortions significantly increase traffic problems. Conversely, parking policy reforms are an excellent way to encourage more efficient transport and development.
- In addition to other benefits, many parking management strategies *directly benefit motorists*. For example, parking facility sharing increases the number of spaces that serve a destination, efficient pricing ensure that motorists can always find unoccupied parking spaces, improved user information helps motorists identify parking prices and availability, and pedestrian improvements improve access

- Parking policy reforms are critical to achieving many of MDDI's strategic planning objectives.

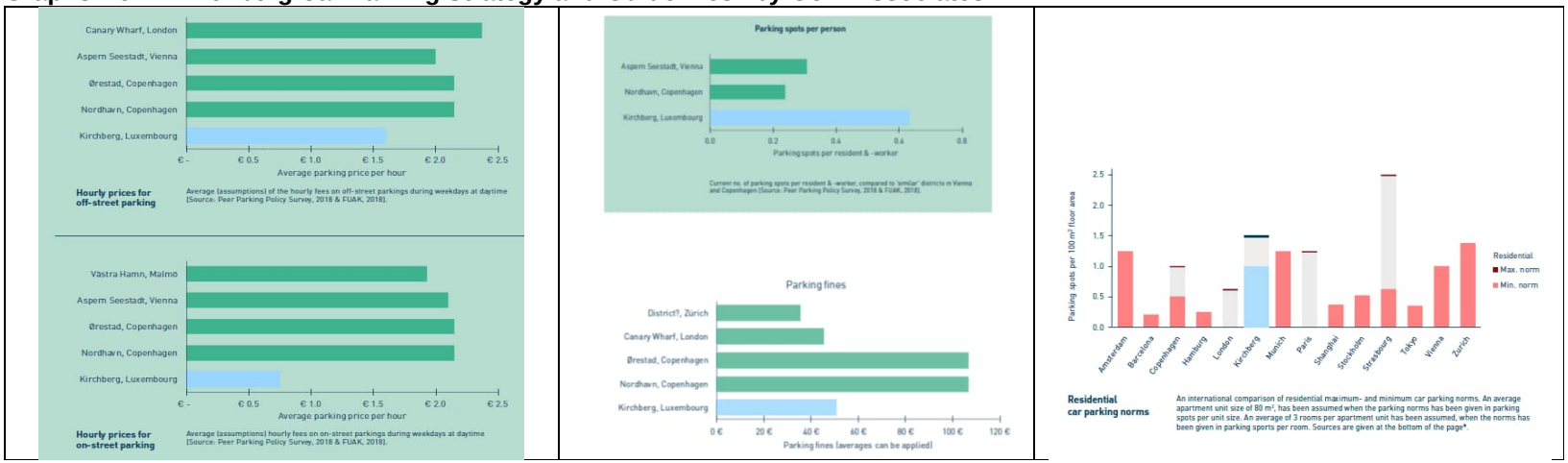
Exhibit 1 **Parking Policy Impacts on MDDI Strategic Objectives** (www.modu2.lu)

Strategic Objective	Supportive Parking Policies
Shift travel from automobiles to more resource-efficient modes (walking, bicycling, ridesharing and transit).	Reducing parking subsidies and efficient parking pricing are very effective at shifting modes.
Promoting carsharing in urban areas.	Reduced and unbundled private parking, and designed carshare spaces support carsharing.
Improve traffic safety and security on sidewalks, bikelanes and roads.	More efficient management can free up space for wider sidewalks, bike- and bus-lanes, and traffic calming.
Reduce the volume of soil that must be evacuated from building sites.	More efficient management can reduce the number of underground parking spaces needed in each building.
Improve motorists convenience	Improve user information and management so motorists can more easily find a parking space.
Reduce traffic congestion while accommodating 20% commute trip growth by 2025, as illustrated below.	Efficient parking pricing and management to encourage mode shifts. Reduce parking supply to allow more compact development which supports efficient modes.

Appropriate parking policies can help achieve many of Luxembourg's strategic planning goals.

- Pricing municipal parking (such as on-street parking) is one of the few ways that local governments can *collect revenue* directly from out-of-town motorists to help pay for the public infrastructure and services they require.
- *Most major cities are implementing parking policy reforms*: they are applying reduced and more accurate minimum parking requirements, or changing from minimums to maximums, applying efficient pricing to municipal parking, encouraging sharing of parking facilities and shifts from driving to more resource-efficient modes, and applying other parking management strategies.
- Many current demographic, economic and technical trends are *reducing automobile travel demand*. Although few people want to forego driving altogether, surveys indicate that many, particularly younger people, prefer to own fewer cars, drive less and rely more on other modes. Public transit service improvements, improved travel information and payment apps, ridehailing, and autonomous vehicles are reducing private vehicle ownership and parking demands, particularly in growing cities like Luxembourg. *Parking management responds to these demands*, for example, by eliminating the requirement that residents pay for parking spaces they don't want, and by improving non-auto modes.
- Luxembourg has higher minimum parking requirements, more spaces per capita, lower municipal parking fees, and lower parking fines *than peer cities* such as London, Zurich and New York.

Graphs from "Kirchberg Car Parking Strategy and Guidelines" by Gehl Associates.



- An efficient parking management program includes *a variety of complementary strategies*, such as efficient pricing and improved travel options, or shared parking and improved walkability between destinations and off-site parking lots.
- Although people often assume that parking management is only appropriate in large cities, it is actually *very versatile and scalable*, and can be applied in smaller cities and towns, suburban areas and resort communities.
- More efficient management is often *the only practical solution to traffic and parking problems*; other solutions are either infeasible or ineffective. For example, it is not feasible to expand roads in Luxembourg, and even if possible the additional capacity would soon fill with generated traffic (additional vehicle trips that would not otherwise occur), providing little long-term congestion reduction. More efficient management is generally the most cost-effective and beneficial solution to traffic problems.
- *Parking management can be flexible and responsive*. Many strategies can be implemented first as a trail, and changed as appropriate based on stakeholder feedback. This can alleviate many fears and objections. For example, parking pricing can be implemented with rates that are adjusted to respond to actual demand and address any problems that occur, such as spillover impacts on side streets. Of course, this requires good data collection to identify problems and track performance.

Examples and Case Study Resources

Here are a few of many possible parking management examples and case studies in peer cities.

European Parking Management (https://bit.ly/2Ib95Ei)

The report, *Europe's Parking U-Turn: From Accommodation to Regulation* examines parking policies and planning practices in ten European cities: Amsterdam, Antwerp, Barcelona, Copenhagen, London, Munich, Paris, Stockholm, Strasbourg and Zurich. It found:

- Parking is increasingly linked to public transport. Amsterdam, Paris, Zurich and Strasbourg limit parking supply in new developments based on proximity to transit services. Zurich increased parking fees and improved transit services. As a result, between 2000 and 2005, transit mode share increased 7% and automobile mode share declined 6%.
- European cities increasingly charge for on-street parking. In Paris, the on-street parking supply has been reduced more than 9% since 2003, and 95% is now priced. Along with other transport improvements, this reduced driving by 13%. Parking reforms are considered a more feasible way to reduce vehicle traffic.
- Revenue gathered from parking tariffs is being invested to support other mobility needs. Several boroughs in London use parking revenue to subsidize transit passes for seniors and the disabled, who ride public transit for free.

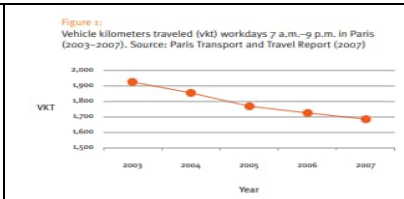
Parking Management Applied in European Cities (https://bit.ly/2UjkPr9)

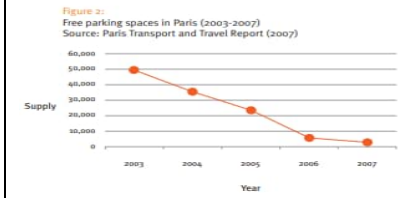
Policies applied in European cities	Amsterdam	Antwerp	Barcelona	Copenhagen	London	Munich	Paris	Stockholm	Strasbourg	Zurich
Pricing Mechanisms										
Curbside Charges	x	x	x	x	x	x	x	x	x	x
Progressive Fee Structure		x								x
Off-Street Price Harmonization		x							x	
Residential Permits	x	x	x		x	x	x	x		
Workplace Levies										
Ring Fencing			x		x					
Regulatory Measures										
Supply Caps	x									x
Minimums	x	x	x	x	x	x	x	x	x	x
Maximums				x						x
Transit Based Min/Max Reductions	x	x			x		x		x	x
Access Bans			x							
Emissions Reduction Goals	x			x			x			x
Public-Private Partnership		x	x		x	x	x	x		
Physical Designs										
Bollards	x						x			
Striped Lines				x	x			x		
Repurposing Public Space	x		x	x			x		x	x
Advanced Technologies										
Electronic Parking Guidance Systems			x			x	x		x	x
Smart Meters							x			
Pay-by-Phone	x	x	x	x	x	x	x	x	x	x
Scan Cars	x									

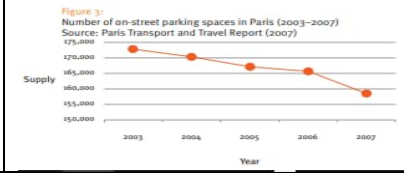
Most European cities are implementing several parking management strategies.

As a result, many are experiencing reductions in per capita car ownership and trips, and declines in per capita parking supply.

For example, between 2000 and 2005, Zurich public transit's modal share went up by 7%, while the automobile's declined by 6% due to a combination of parking management and public transit service improvements.







CIVITAS Examples (http://civitas.eu/demand-management/parking)

CIVITAS (City VITAlity and Sustainability) is a network of European cities dedicated to cleaner, better transport. CIVITAS examples include 26 innovative parking management programs in 20 cities as this map indicates.

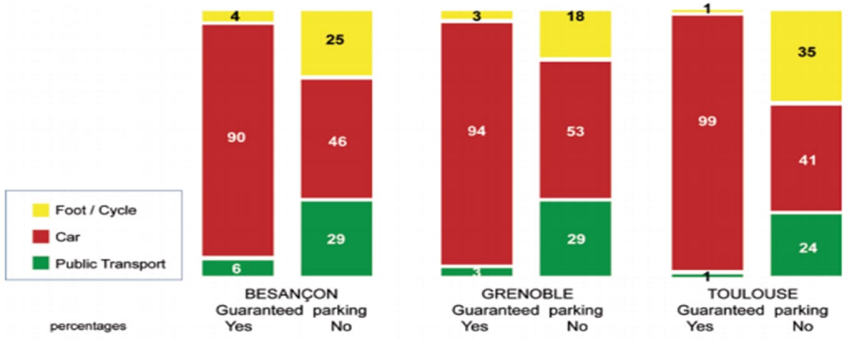
Case Studies for Parking Management Catalogue (http://push-pull-parking.eu/index.php?id=57)

The European *PUSH & PULL* project focuses on synergies between parking management and mobility management measures studied by the. "Push" strategies include the introduction of paid parking, the increase of fees, or the reduction of supply to encourage travellers to use more sustainable transport. The income from parking can be earmarked to finance "Pull" measures, such as improving and promoting sustainable alternatives.

This catalogue contains measures on the city level but also on the site level (workplaces / universities / hospitals) and on a national level. The description includes objectives, steps for implementation, potential barriers and how they have been overcome, costs and impacts. These 24 best practice examples were selected and prepared as case studies using criteria such as "Implementation status", "Innovative approach" or "Availability of evaluation data or documentation."

The "Making Parking Precious" (http://civitas.eu/demand-management/parking) project found that cities can reduce parking and traffic problems by implementing integrated parking management strategies based upon economic incentives and regulatory measures. Differentiated pricing schemes for parking are an effective means to reduce congestion and pollutant emissions in an urban context. Parking measures should be based on thorough analysis of parking data and facilities. Tariffs should carefully be differentiated across target areas and user groups.

Guaranteed Parking Impacts on Commute Mode Share (www.europeanparking.eu/media/1279/12122014_push_pull_a4_en.pdf)



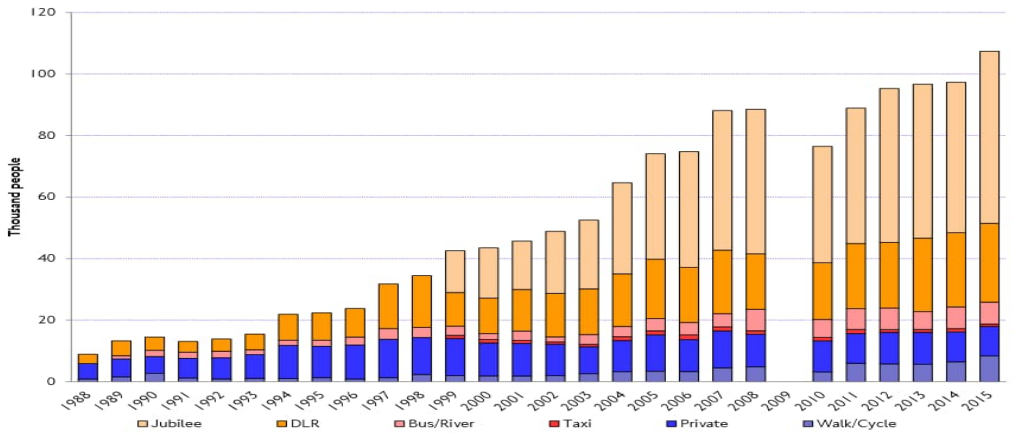
This figure illustrates how guaranteed parking tends to increase automobile commuting rates in French cities.

The brochure, *16 Good reasons for Parking Management* (https://bit.ly/2HVBEFQ) provides the knowledge required to build sound, political arguments to help to alleviate parking problems and in so doing to support sustainable transport. It should strengthen the position of politicians, decision makers and information multipliers such as journalists in the process of taking what may be, at first glance, unpopular, but in fact rational and sustainable decisions to manage on- and off-street parking. The arguments are wide-ranging: how to deal with scarcity of urban space, how to improve access and the quality of life, how to increase safety, how to support the local economy, how to reduce 'parking search' traffic, how to turn initial resistance into support, why to set standards, etc.

16 Good Reasons includes facts and figures accompanied with pictures or diagrams and an explanatory text that it is easily understood and quickly summarizes the key arguments. For more complex issues, links to more detailed descriptions are provided. The brochure is available for download in 17 languages. European PUSH & PULL project (http://push-pull-parking.eu/index.php?id=57)

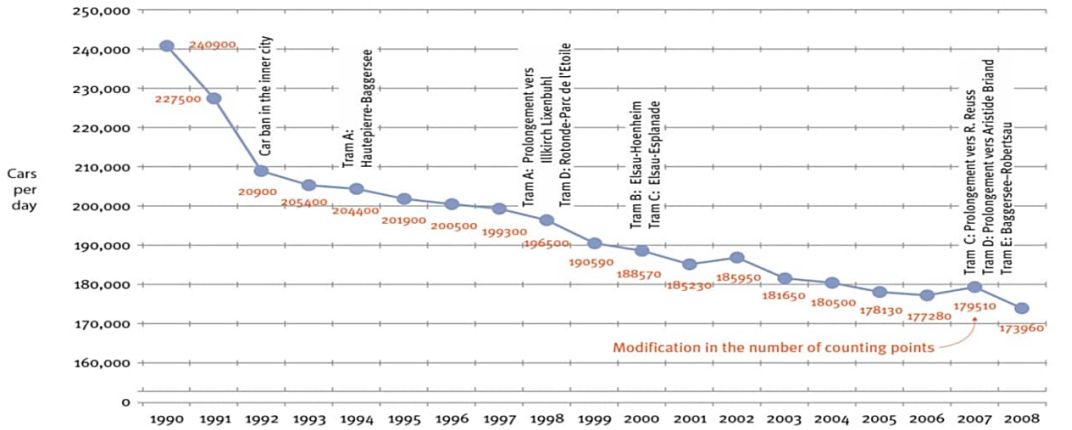
Parking management contributes to a better modal choice and therefore quality of life.

Canary Wharf Traffic Growth by Mode



During the past 25 years, London's Docklands (Canary Wharf) has developed into a high-density, high-value financial and business district. Before 1999 private vehicles had the highest mode share. After the Jubilee Line extension opened public transit ridership grew. By 2015, the Underground carried more than half of all trips and private vehicles fell to 10%. These travel patterns reflect wider trends in London, with sustained and substantial shift in mode share away from private vehicles towards public transport.

Reduction in Total Strasbourg Vehicle Trips (https://bit.ly/2UjkPr9)

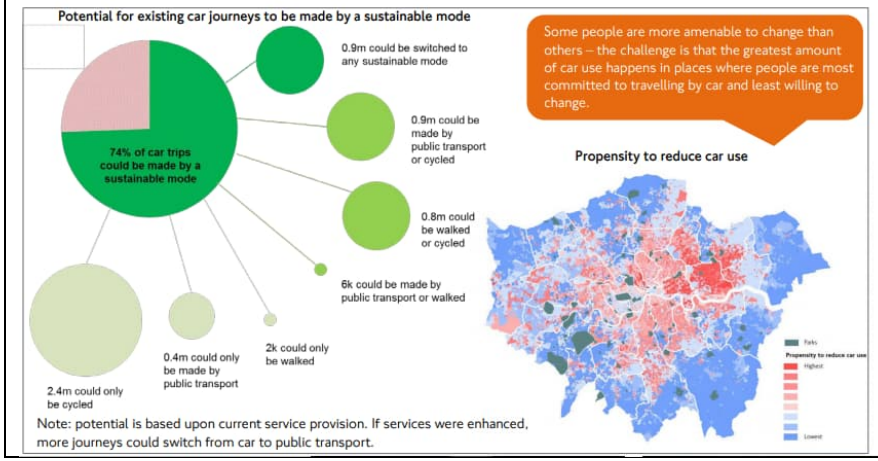


Strasbourg controls car use through parking, bicycle promotion, public transit improvements, and Pedestrianization. Automobile mode share declined from 52% in 1997 to 46% in 2009. Over 18 years there has been a 28% decrease in the number of vehicles entering Strasbourg.

Regional Parking Management (https://bit.ly/19vMxck)

The report, *The Relevance of Parking in the Success of Urban Centres, A Review*, for London Councils (Tyler, et al. 2012), investigated links between parking and urban centre success. They recommend various parking data collection improvements to help public officials identify parking problems and evaluate potential solutions. They found:

- More parking does not necessarily mean greater commercial success. Improved parking management can support businesses as much as an increase in parking supply.
- There is no such thing as 'free' parking, parking costs are either borne directly or indirectly.
- Shopkeepers consistently overestimate the share of their customers coming by car.
- Car drivers spend more on a single trip; walkers and bus users spend more per week or month.
- A good mix of shops and services and a quality environment are some of the most important factors in attracting town centres visitors. If these are poor, parking are unlikely to attract many visitors.
- Boroughs collect parking data but less information on town centre economic factors. Finding ways to coordinate data collection across departments can help monitor the impacts of parking policies.



Surveys indicate that three-quarters of London car trips could be made by a more sustainable mode, but many people are reluctant to change.

TfL (2017), *Mayor's Transport Strategy: Supporting Evidence Challenges & Opportunities*, Transport for London; at http://content.tfl.gov.uk/mts-supporting-evidence-challenges-opportunities.pdf.

New York City Street Evaluation and Parking Policy Reforms

The report, *Measuring the Street: New Metrics for 21st Century Streets* (www.nyc.gov/html/dot/downloads/pdf/2012-10-measuring-the-street.pdf describes how New York City is expanding the scope of planning goals and performance indicators for evaluating city streets designs. This approach recognizes that urban streets play many functions, including accessibility, mobility, loading and unloading, vehicle parking, and serving as a public realm. This can justify more efficient parking management in order to better serve divers uses.

New York City Street Performance Metrics (NYCDOT 2012)

Goals	Strategies	Metrics
• Safety • Accommodate all users • Create great public spaces	• Design safe streets • Build great public spaces • Improve bus service • Reduce delay and speeding • Efficiently manage parking and loading	• Crashes and injuries by all modes • Vehicle, bus passenger, bicycle rider, and public space user volumes • Traffic volumes • Travel speeds • Traffic speeds (not too slow or too fast) • Economic vitality (retail sales, building vacancies, visitors) • Bus ridership and travel speeds • User satisfaction • Environmental and public health quality • Double parking and parking duration

New York City has established these goals, strategies and metrics for evaluating city street performance.

The New York City *PARK Smart* (www.nyc.gov/html/dot/html/motorist/parksmart.shtml) adjusts parking meter rates to reflect demand, so prices are higher at times and locations where parking facilities are congested, and reduced where demand is lower. The NY Department of Transportation works closely with community boards, merchants, BIDs and other local stakeholders to optimize these rates. Although initially introduced as pilot projects, several were considered successful and so were made permanent.

The report, *Suburbanizing the City: How New York City Parking Requirements Lead to More Driving* (Weinberger, Seaman and Johnson 2008) recommends the following reforms for more sustainable parking management in New York City:

1. Fully assess the amount of existing and planned off-street parking.
   - Inventory existing and planned off-street parking to provide a baseline.
   - Measure how much driving is created by new off-street parking.
   - Determine parking demand based on the assumption that off-street parking has a cost.

- Measure the effect of increases in parking growth on local and citywide traffic congestion.

2. Consider measures to significantly reduce required parking.
   - Unbundle the price of parking from the cost of new residences.
   - Eliminate minimum parking requirements.
   - Reclassify minimum parking requirements as maximums.
   - Peg the maximum parking requirement to the proximity to transit.
   - Establish impact fees for new parking spaces.
   - Prohibit curb cuts on key pedestrian and transit streets.
   - Incentivize car-sharing spaces in new development.

3. Revise environmental laws to fully account for parking impacts.

- Revise CEQRA and the special permitting process so that the cumulative impact of new parking on neighborhoods is considered.

4. Stop directly subsidizing new parking and freeze special permits

- Place a moratorium on issuing new special parking permits in Manhattan's Clean Air Act Zone (the Manhattan Core) until an inventory of existing and planned parking is completed and a study conducted of cumulative environmental impact of new parking.
- Freeze new city subsidies for building parking until a complete accounting of the extent and environmental impact of those subsidies is completed.
- Eliminate minimum parking requirements for affordable housing developments.

Downtown Pasadena Redevelopment (Kolozsvari and Shoup 2003)

During the 1970s Old Pasadena's downtown had become run down, with many derelict and abandoned buildings and few customers, in part due to the limited parking available to customers. Curb parking was restricted to two-hour duration but many employees simply parked in the most convenient, on-street spaces and moved their vehicles several times each day. The city proposed pricing on-street parking as a way to increase turnover and make parking available to customers. Many local merchants originally opposed the idea. As a compromise, city officials agreed to dedicate all revenues to public improvements that make the downtown more attractive. A Parking Meter Zone (PMZ) was established within which parking was priced and revenues were invested.

Connecting parking revenues to added public services and keeping it under local control helped guarantee the program's success. Merchants began to see parking meters in a new way: as a way to fund the projects and services that directly benefit their customers and businesses. The PMZ Advisory Board, consisting of business and property owners, recommended policies and set priorities for revenue spending. Investments

included new street furniture and trees, police patrols, better street lighting, more street and sidewalk cleaning, pedestrian improvements, and marketing (including production of maps showing local attractions and parking facilities). To highlight these benefits to motorists, each parking meter has a small sticker which reads, "Your Meter Money Will Make A Difference: Signage, Lighting, Benches, Paving."

This created a *virtuous cycle* in which parking revenue funded community improvements that attracted more visitors, new businesses and residential development, which increased parking revenue, allowing more improvements. Parking is no longer a problem for customers, who can almost always find a convenient space. Local sales tax revenues increased far faster than in other shopping districts and malls with cheaper or free parking. This indicates that charging market rate parking (i.e., prices that result in 85-90% peak-period utilization rates) with revenues dedicated to local improvements can be an effective ways to support urban redevelopment. Pasadena's parking management program consists of many interrelated initiatives.

Right-Size Parking Study (www.rightsizeparking.org)

The *King County Right Size Parking Project* has developed practical tools for more accurately calculating parking demand, taking into account geographic and economic factors. The study used detailed vehicle ownership and travel survey data to determine the parking demands in particular neighborhoods in the Seattle, USA region. It found that parking demand per unit declines with increased transit proximity, local population and employment density, and parking price (the amount that residents must pay extra, if any, for a parking space), and increases with rents, unit size and number of bedrooms. The resulting model can be used to determine the parking needed in a particular development.

San Francisco Regional Value Pricing Parking Program (http://regionalparking.mtc.ca.gov)

SFpark is a demand-responsive parking pricing program which periodically adjusts meter and garage pricing up and down to match demand, and gives motorists' real-time information on parking availability and prices so they can easily find the best options for their needs, and rely more on underused areas and garages. *SFpark* bases prices on observed occupancy. Planners cannot reliably predict the right price for parking on every block at every time of day, but they can use a simple trial-and-error process to adjust prices in response to occupancy rates. This process of adjusting prices based on occupancy is often called performance pricing. In addition to efficiently managing parking, SFpark helps depoliticize the process by setting a clear pricing policy. San Francisco charges the lowest prices possible without creating a parking shortage. Transparent, data-based pricing rules can bypass the usual politics of parking. Because demand dictates the prices, politicians cannot simply raise them to gain more revenue. This project found:

1. Most study locations have excess parking supply. While some streets have high occupancy rates during peak periods, there are significant amounts of unused parking spaces in lots and structures within a few blocks in almost all the locations at almost all times.
2. Many pricing policies are contradictory. There is a lack of coordination between on- and off-street parking prices. On-street parking prices are often free or lower than off-street parking prices, which often results in drivers clogging up local business districts while they search for a space.

3. Many parking requirements are not closely aligned with demand of the relevant population in the local context. Households that are younger or lower income and who have good walk/bike and transit access have lower automobile ownership rates. High parking requirements make housing less affordable.
4. When parking structures are included in transit projects, there is often a lack of analysis of relative cost and effectiveness of alternative modes of access and pricing on the need for or appropriate size of a structure. Housing would often provide higher transit ridership and more fare transit agency revenue.
5. Employee programs that charge for parking are the most effective in reducing driving to work. However, many employers are reluctant to charge for parking. Parking cash-out is an attempt to put charging for parking into a more favorable perspective, but is seldom implemented.
6. Responsive pricing increases prices in areas with particularly high demand, but reduces prices in a larger number of areas, when and where parking spaces have less than 85% occupancy.

Before SFpark began in August 2011, the on-street parking price $3 an hour at all times. The program applied different prices during three periods of the day—before noon, from noon to 3 pm, and after 3 pm. By May 2012, prices on almost every block had decreased for the period before noon and increased between noon and 3 pm. Most prices after 3 pm were lower than during mid-day, but higher than in the morning. During its first two years, SFpark adjusted prices 11 times on each block for three different periods during the day. Prices increased in 31% of the cases, declined in 30%, and remained the same in 39%. On average, prices declined in the morning and increased in the midday and afternoon. The average price fell 4%, which means SFpark adjusted prices up and down according to demand without increasing prices overall. Because occupancy rates have moved toward the target goals, the share of blocks needing no price adjustment has slowly increased since the program began. By August 2013, after the program had been operating for two years, 62% of blocks were in the target range. Altogether, a third of all the blocks that had been over- or under-occupied at the beginning of SFpark had shifted into the target occupancy range.

This project demonstrated that performance parking prices can improve transportation efficiency, are they fair? In San Francisco, 30% of households do not own a car, so they don't pay anything for curb parking. How the city spends its parking revenue also affects the equity implications of charging for parking. San Francisco uses all its parking meter revenue to subsidize public transit, so automobile owners subsidize transit riders. SFpark will further aid bus riders by reducing traffic caused by drivers cruising for underpriced curb parking. Because demand was, on average, inelastic, the city could increase revenue by charging higher prices. However, SFpark's goal is to optimize occupancy, not to maximize revenue, and the average price of parking fell by 4% during SFpark's first two years.

> Gregory Pierce and Donald Shoup (2013) "Getting the Prices Right: An Evaluation of Pricing Parking by Demand," Journal of the American Planning Association, 79(1): 67–81; summary at www.accessmagazine.org/wp-content/uploads/sites/7/2015/10/SFpark.pdf.

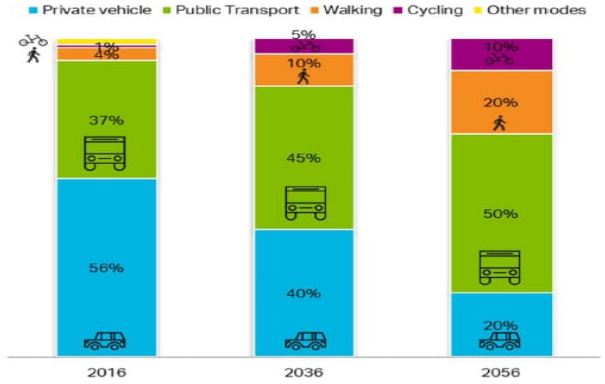
Commercial District Parking Management

In his book *Principles of Urban Retail*, Gibbs (2013) describes various ways to create more attractive urban retail centers, including ways to manage parking for shopper convenience. The book describes various types of urban shopping demands and the types of retail centers that serve them. It emphasizes the importance of convenience and secure parking that accommodates various types of customers. The book points out that accepted parking ratios for regional centers have declined significantly in recent decades, from 10 cars per 1,000 square feet of building area during the 1960s to 4.0 to 4.5 per today, and that this can be further reduced in urban centers, particularly if parking supply is efficiently managed. Gibbs recommends pricing the most convenient parking spaces to ensure that parking spaces are always available to shoppers in a hurry, and that the parking meters be convenient to use.

Parramatta, Australia

The Parramatta Central Business District (CBD) is a large and rapidly-growing commercial center located west of Sydney, Australia. It aspires to be the region's second major commercial district. The City anticipates more than 50% increases in residents and jobs during the next two decades. The City is also committed to accommodating this growth in ways that maintain the area's livability and sustainability. A key component of this objective is to provide convenient and efficient mobility for people and goods in the CBD, without increasing motor vehicle trips or parking supply. In 2016, the City changed its previous parking minimums into maximums, which will reduce supply and create demand for commercial parking. These are relatively low, allowing up to 1.2 spaces per dwelling unit, up to 1 space per 100m^2 of commercial space, and up to 1 space per 30m^2 of retail space.

Parramatta CBD Mode Share Targets

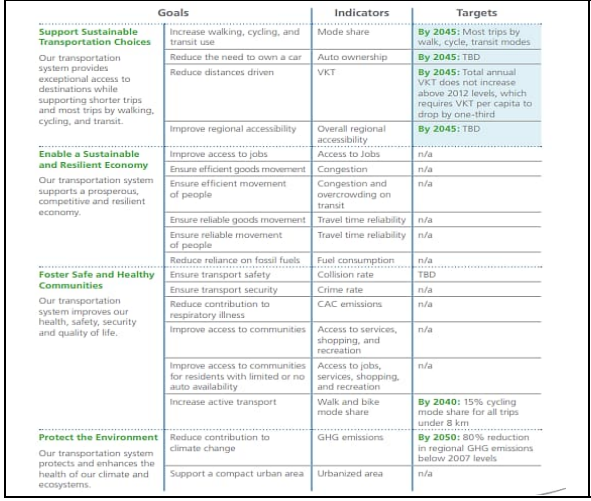


Parramatta plans significant commute mode shifts from automobile to other modes.

Vancouver Automobile Trip Reduction Goals, Targets and Indicators (https://bit.ly/2EOlOdq)

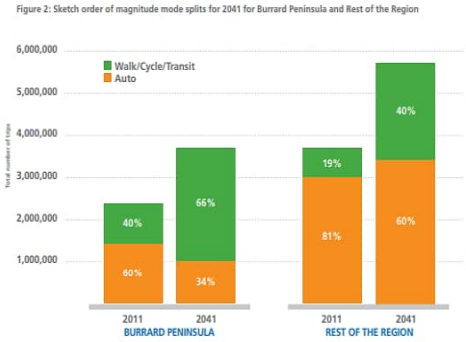
Vancouver, Canada (https://bit.ly/2HhABPy), and its regional transportation authority, TransLink, have established sustainable transportation performance goals, indicators and targets. They produce annual *Accountability Reports* (https://bit.ly/2VxEioi), which track trends and peer comparisions. These indicate progress toward goals, as illustrated below.

Goals

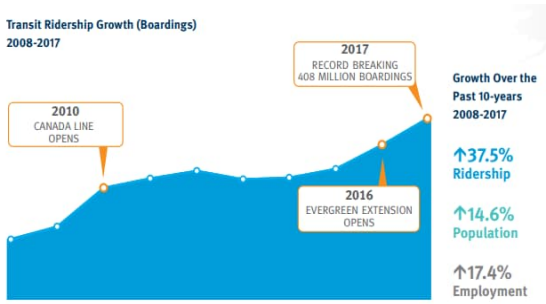


Goals		Indicators	Targets
Support Sustainable Transportation Choices Our transportation system provides exceptional access to destinations while supporting shorter trips and most trips by walking, cycling, and transit.	Increase walking, cycling, and transit use	Mode share	**By 2045:** Most trips by walk, cycle, transit modes
	Reduce the need to own a car	Auto ownership	**By 2045:** TBD
	Reduce distances driven	VKT	**By 2045:** Total annual VKT does not increase above 2012 levels, which requires VKT per capita to drop by one-third
	Improve regional accessibility	Overall regional accessibility	**By 2045:** TBD
Enable a Sustainable and Resilient Economy Our transportation system supports a prosperous, competitive and resilient economy.	Improve access to jobs	Access to Jobs	n/a
	Ensure efficient goods movement	Congestion	n/a
	Ensure efficient movement of people	Congestion and overcrowding on transit	n/a
	Ensure reliable goods movement	Travel time reliability	n/a
	Ensure reliable movement of people	Travel time reliability	n/a
	Reduce reliance on fossil fuels	Fuel consumption	n/a
Foster Safe and Healthy Communities Our transportation system improves our health, safety, security and quality of life.	Ensure transport safety	Collision rate	TBD
	Ensure transport security	Crime rate	n/a
	Reduce contribution to respiratory illness	CAC emissions	n/a
	Improve access to communities	Access to services, shopping, and recreation	n/a
	Improve access to communities for residents with limited or no auto availability	Access to jobs, services, shopping, and recreation	n/a
	Increase active transport	Walk and bike mode share	**By 2040:** 15% cycling mode share for all trips under 8 km
Protect the Environment Our transportation system protects and enhances the health of our climate and ecosystems.	Reduce contribution to climate change	GHG emissions	**By 2050:** 80% reduction in regional GHG emissions below 2007 levels
	Support a compact urban area	Urbanized area	n/a

Targets



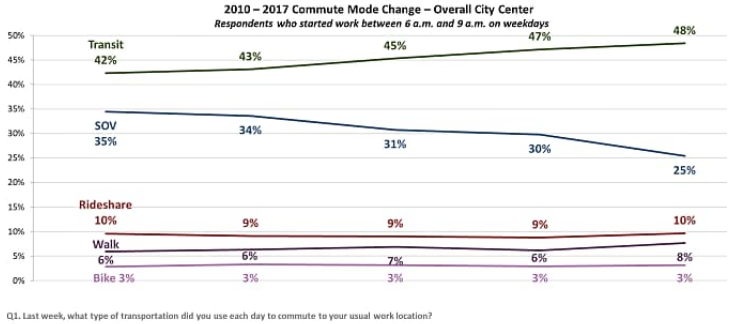
Outcomes



Puget Sound TDM Policies

State legislation (https://www.wsdot.wa.gov/Choices/Demand.htm) and regional planning regulations (https://bit.ly/2TymU5w and https://bit.ly/2EPO1Ru) require larger employers in the Seattle area, Puget Sound region, to have commute trip reduction plans, with trip reduction performance indicators and targets, although there are no legal penalties for failing to meet those targets. State, regional and local governments all provide support.

2010 to 2017 Mode Share Time Series (https://bit.ly/2Tyoa8K)



Issues Summary Table

MDDI		Litman		
Stakeholder	Typical Concerns (C) / Statements (S) / Objectives (O)	Snappy strategic messages in favour of parking management, with quantitative elements	Data points that need to be collected for the quantitative element of each message	How to efficiently collect these data points
National Government	Reduces land consumption (O)	• Pavement is ecologically sterile; the least desirable land use. • 10-30% of the urban area is devoted to parking, including some of the region's most valuable lands. • Parking displaces other productive uses including other modes (sidewalks, bike- and bus-lanes), buildings and greenspace. • Parking management can make this land available for more productive and attractive uses. It can help preserve heritage sites and streetscapes, making villages and cities more attractive.	• The portion of land devoted to parking facilities. • Amount and value of land that could become available with more efficient management. • Streetscape images with more and less parking. • Examples of trade-offs that designers, developers and planners make between parking and greenspace. • Value of land devoted to parking, and the savings from better parking management.	• Parking supply inventories. Data can be collected during property surveys and included in assessment records. • Perform targeted parking inventories in specific areas such as commercial districts other areas with parking congestion problems. • Aerial and satellite photos are sometimes used. • All data should be incorporated into GIS mapping systems.
	Reduce traffic congestion by reducing car use and promoting shifts to non-auto modes (O)	• Increasing parking supply and reducing parking prices increases vehicle ownership and use, and therefore traffic problems. (McCahill, et al. 2016) • "Minimum parking requirements act like a fertility drug for cars." (Shoup). • Many parking management strategies, such as pricing parking, improving walkability, and encouraging non-auto modes, reduce total vehicle trips. • Efficient parking management typically reduces 20-40% of vehicle trips, and	• Factors that affect peak-period trip generation. • Traffic modelling concerning future traffic growth and congestion problems. • Examples parking management impacts on vehicle trip generation.	• Travel surveys that include questions on factors that affect peak-period trips (commuting). • Traffic and parking demand models. The Dutch CROW model is a good example of what can be developed. • Successful examples of parking management programs that reduce peak-period trips.

		more if implemented with an integrated transport management program (Pierce and Shoup 2013; Spears, Boarnet and Handy 2014).		
	Improve travel options by converting on street parking into bus and bicycle lanes	• Lux case studies of capacity increase/mode shift through conversion of parking lane to bus or cycle lane. • Many people want to travel by transit and bike provided they are efficient and convenient. • Serving these demands helps create a cycle of more use and better conditions of these modes. • These mode shifts provide many benefits and help achieve national planning goals.	• Latent demand for transit and biking. • Travel impacts from converting parking lanes to bus and bike lanes, with complementary parking management strategies such as efficient parking pricing. • Analysis of travel shifts needed to achieve national goals, and the role that parking management will play in achieving those goals.	• Travel surveys, with special attention to latent demand for transit and biking, and factors that would increase their use. • Travel and parking demand models that are sensitive to bus/bike lanes and parking management strategies.
	Promote car-sharing (O)	• Many households prefer not to own a car provided they have efficient alternatives, such as carsharing. • Reducing vehicle ownership helps achieve national planning goals.	• Demand for carsharing, with complementary parking management strategies, such as unbundling and improved transit.	• Surveys concerning demand for carsharing. • Studies of carsharing and complementary parking management strategies.
	Reduce air pollution (O)	• Vehicle travel reductions will be necessary to achieve Luxembourg's emission reduction targets. • Parking management complements other emission reduction strategies such as mode shifting and more compact development.	• The role that vehicle travel reductions play in Luxembourg's emission reduction plans. • The role that parking management strategies play in reducing vehicle travel.	• Transport emission reduction models and plans. • Consumer demands and preferences for vehicle travel reductions, and how parking management can help achieve those demands.
	Reduce excavation masses (O)	• Where land is valuable, parking is underground, which has high financial and environmental costs.	• Typical parking facility financial costs.	• Parking facility financial and environmental cost studies.

		• How much parking is underground and how many m3 of soil is evacuated? • When urban parking is priced at cost recovery, demand generally declines significantly.	• Typical parking facility environmental costs. • Examples of parking facilities that are economically inefficient (users would not pay full cost-recovery prices)	• Parking demand studies, identifying the portion of parking spaces that users would not choose with cost-recovery pricing.
	Reduce impervious surface areas (O)	• Parking facilities are a major portion of urban impervious surface area.	• Analysis of parking facility impervious surface area, environmental and stormwater management costs.	• Parking facility GIS mapping. • Stormwater management modelling and cost analysis.
Municipalities	Citizens want convenient parking (S)	• Efficient parking management does not eliminate parking or driving; it serves parking demands more efficiently and improves alternatives so travellers can choose the best option for each trip, which could be their current option, a different parking facility, or a different mode. • Most cities around the world are implementing efficient parking management to better serve travellers and achieve community goals.	• Consumer demands for alternative parking and transport options. • Examples of benefits to motorists, local businesses and residents. • Parking management impacts and benefits, and how it can help achieve community goals. • Examples from peer communities.	• Information on parking management strategies, and their impacts and benefits. • Consumer surveys concerning their demand for better parking and travel options. • Examples of successful parking management programs in peer communities. • Professional development workshops and field visits to peer communities.
	I prefer on-street parking (for my citizens) to bus lanes (used by citizens of other municipalities in transit) (S)	• There are many reasons that communities encourage space efficient modes, such as bus commuting. • When properly planned, the on-street parking spaces displaced are more than offset by auto trips that shift to transit. Everybody wins!	• Understand traveller demands, particularly commuters' willingness to shift from driving to public transit with improved service and complementary parking management strategies, such as more efficient pricing.	• Travel models, with special attention to factors that affect auto to transit mode shifting. • Travel surveys that focus on factors that affect transit demands.

	Parking management can be difficult to implement in small municipalities (S)	• Most successful communities around the world are implementing parking management programs. • Many good resources are available for parking management implementation.	• Information on parking management planning and resources. • Successful examples of parking management in peer communities.	• Professional development workshops and field visits to peer communities. • Examples of parking management planning resources.
	We want to reduce local traffic noise and air pollution (C/O)	• Many parking management strategies reduce vehicle trips and pollution. • Parking management is often the most effective and cost-effective way to reduce traffic congestion and achieve emission reduction goals.	• How parking management strategies can reduce vehicle travel, congestion and emissions.	• Transport and emission modelling. • Successful examples of municipal congestion and emission reduction programs that include parking management strategies.
	We want to reduce land consumption (O)	• A major portion of valuable urban land is devoted to parking facilities. • Parking management can make this land available for more productive and attractive uses. • Parking management can help preserve heritage sites and streetscapes, making villages and cities more attractive.	• Arial photos and maps showing parking land area. • Amount and value of land that could become available with more efficient management. • Streetscape images with more and less parking. • Parking facility valuation.	• Parking supply inventory and valuation surveys, which may be included in property ownership and assessment records. • GIS mapping systems. • Examples of heritage preservation, parks planning and streetscaping projects.
	We want to improve local quality of life (O) by creating more functional and attractive communities	• By reducing pavement area and vehicle traffic, parking management can make communities more attractive and livable, and help improve public health and safety.	• How parking management affects impervious surface area, traffic congestion, noise, pollution, accidents and physical fitness.	• Parking inventory and valuation surveys. • Images of streetscapes with more and less parking. • Examples of livability impacts.
	We want to improve walkability (O)	• Can free up land and curb space currently devoted to parking for other	• Land and curb area devoted to each mode.	• Surveys of parking spaces and curb use.

		uses, including wider sidewalks and other streetscape improvements. • Many cities are redesigning streets to enhance walkability and livability.	• The ability to shift land and curb area from parking to other modes, and potential benefits that would provide.	• Examples of roadway redesigns that improve walkability.
	We want to create secured bike lanes (O)	• Many people want to bicycle, provided there are bikelanes. • Bicycling provides many benefits and helps achieve local planning goals, including reduced parking demand.	• Latent demand for biking. • Travel impacts of bike lanes. • Analysis of travel shifts needed to achieve community goals.	• Travel surveys, with special attention to bicycling. • Multi-modal travel models that are sensitive to active modes.
	We want to reduce impervious surfaces and stormwater management costs (O)	• Parking facilities are a major portion of urban impervious surface area.	• Parking facility surface area, and their environmental and stormwater management costs.	• Parking facility GIS mapping. • Stormwater management modelling and cost analysis.
	• Residents complain about parking spillover (including park and ride), but it is not cost effective to hire municipal agents to enforce parking regulations (S)	• Effective parking management requires an integrated program with regulations, pricing and enforcement to control spillover problems. • Parking pricing and fine revenues can pay for enforcement. • Most cities address this problem. • If necessary, enforcement can be contracted to private companies.	• Information on parking spillover problems. • Information on regulation, pricing and enforcement options. Examples in Weinberger, et al. 2013	• Parking occupancy surveys. • Examples of integrated parking management programs. • Examples of successful parking enforcement programs.
Employers	• My employees must drive to work because they need their car for professional trips during the day (S)	• Parking management does not eliminate parking or driving; it results in more efficient parking and travel. • Many parking management strategies increase motorist convenience, particularly for high value trips, such as deliveries and business meetings. • Businesses can provide shared vehicles.	• Examples of ways that parking management benefits professionals. • Examples of successful parking management programs. • Examples of businesses that have vehicle fleets or carsharing arrangements.	• Parking management benefit analysis, including benefits to employees and businesses. • Examples of successful parking management programs in peer cities and offices.

	• Since we own our parking lot, we should control its use, rather than have government management (S)	• Parking management does not eliminate parking – it *reduces* minimum parking supply requirements. • It can provide substantial savings and benefits to employees and businesses, as well as communities (e.g., reduced traffic congestion).	• Information on integrated parking management programs. • Examples of ways that parking management benefits businesses, including financial savings.	• Parking management benefit analysis, including benefits to employees and businesses. • Examples of successful parking management programs in peer cities and offices.
	• If parking supply is restricted I will relocate my business to a suburban or rural area, because more parking spaces are allowed by rural municipalities (S)	• Businesses are generally most accessible to employees and customers if located in a central urban area. • Many employees and customers prefer multimodal access – they want to drive less and rely more on non-auto modes. • Efficient parking management provides savings and benefits to businesses.	• Information on the benefits of locating in an accessible urban area, including savings to users and businesses. • Employee and customer accessibility preferences.	• Analysis of time and money costs to access urban, suburban and rural locations. • Commuter travel and preference surveys (how many commuters use non-auto modes, or would prefer to if available).
	• I can't find enough land to build office space and industry (S)	• Parking management reduces the amount of land needed to serve employees and customers; it helps solve this problem. • Many businesses use parking management to allow growth within their existing sites.	• Parking facility costs, and therefore savings from reduced demand. • How parking management reduces business costs by reducing parking demands, and benefits employees by improving alternative modes.	• Analysis of parking facility costs, and potential savings from more efficient management. • Examples of successful parking management programs.

Developers	• Unbundling parking from building space isn't possible because of minimums required by all municipalities (S)	• This is often true, so parking management starts with reduced and more flexible parking requirements so businesses are able to capture the savings from reduced demand. • Regulations often result in economically-excessive parking supply (more than users would choose if they paid directly), which contradicts planning goals.	• Degree that parking regulations exceed user demands, increase costs, and contradict other planning goals such as more compact development and reduced traffic congestion.	• Parking facility costs. • Parking demand, and the degree that current regulations force developers to supply more parking than users demand. • Model the increased vehicle travel caused by economically excessive parking supply.
	• Public sharing of private parking is not possible because every developer builds parking inside his own building with its own parking. The parking spaces are not publicly accessible. (S)	• Parking management can overcome these obstacles, so it is easier for building owners and operators to share parking and in other ways reduce parking supply and costs. • Developments should be designed to respond to changing building and parking demands, for example, to allow parking lots to be shared or converted to other uses.	• Information on strategies that support parking sharing. • Examples of successful parking sharing programs.	• Parking facility costs. • Examples of successful sharing in peer communities and developments.
	• Flats without parking are unmarketable (S)	• Parking management unbundles parking, so occupants are not forced to pay for parking they don't demand, but can if they want. • Many flats are sold without parking. • Current trends are increasing demand for unbundled parking.	• Evidence of the potential savings and benefits of unbundling. • Evidence of declining vehicle ownership and parking demand.	• Analysis of residential parking costs and typical user savings from unbundling. • Research concerning future vehicle and parking demand.

	• Parking makes my investment more attractive (S)	• By improving user options and reducing development costs, parking management can make your investments even more attractive. • Current trends are changing travel and parking demands; parking management helps future-proof your investments by providing flexible responses to changing needs and preferences.	• Potential savings and benefits from more efficient parking management. • Demographic, economic and technical trends that are likely to change future travel and parking demands, and how to respond to these changes.	• Analysis of potential savings and benefits provided by parking management, including user benefits and facility cost savings that can increase investment returns. • Analysis of trends that are likely to change travel and parking demands, and the roles that parking management can play in responding to those changes.
Retailers	• My clients need a parking space for free and in front of my store (S)	• Efficient management can prioritize use of parking spaces in high demand areas, ensuring that a space is always available for high value uses, including deliveries and customers.	• Information on parking prioritization strategies. • Examples of successful parking management in retail areas.	• Information on on-street parking management strategies. • Examples of successful programs in comparable areas.
	• If my clients don't find a parking space nearby, they will go to the big malls with a huge offer of parking spaces (S)	• Efficient management can make areas more cost-effective (lower rents), convenient to access, and more attractive (nicer streetscapes), so shopping streets are more competitive with out-of-town malls.	• Information on retail area parking management strategies. • Examples of successful retail areas parking management programs.	• Information on retail area parking management. • Examples of successful programs in comparable areas.
Logistics	• Traffic congestion reduces the punctuality of my deliveries (S)	• Many parking management strategies reduce vehicle trips and therefore congestion. • Parking management supports TDM strategies.	• Analysis of parking management vehicle trip reduction impacts.	• Analysis of congestion costs, and how they could be reduced by various parking and transport management strategies.

	• I need more parking spaces dedicated to delivery (S)	• Parking management can prioritize curb space to favor higher-value uses including deliveries and urgent errands.	• Analysis of parking management curb prioritization impacts.	• Analysis of how parking management can ensure that parking is always available for high-value uses, such as deliveries.
Schools	• Teachers can't use public transit because they have to travel between different schools (S), so they have to use a car and need a parking space	• Parking management does not eliminate parking and driving; it can ensure that teacher who must drive can more easily find a parking space. • It can increase mobility options, so the need for private car trips and parking spaces are reduced.	• Teach travel needs and preferences. • How parking management can benefit teachers by improving parking services and non-auto mobility options.	• School travel surveys. • School parking management strategies. • School parking management benefit analysis. • Examples of school parking management programs.
	• Drop off areas and bus platforms are used as parking (C)	• Parking management can reduce these problems by better identifying, prioritizing and enforcing use of campus drop off and parking areas.	• How parking management can support the prioritization of campus drop off and parking facilities.	• School travel surveys. • School parking prioritization strategies. • Examples of school parking management programs.
	• Efficient parking management isn't easy to handle for a school (C)	• Parking management can help address many campus problems including parking facility costs, traffic and parking congestion, and inadequate mobility for non-drivers.	• How parking management can support school goals. • Examples of successful school parking management programs.	• School travel surveys. • School parking management strategies. • Examples of successful programs in peer schools.
Bus Operators	• Traffic congestion has a huge impact on bus service punctuality (S)	• Many parking management strategies reduce vehicle trips and therefore congestion. • Many parking management strategies encourage transit travel, which can justify more bus service improvements.	• Analysis of parking management vehicle trip reduction impacts. • Analysis of ways that parking management encourages bus ridership.	• Analysis of bus congestion costs, and how they could be reduced by various parking and transport management strategies. • Analysis of additional bus ridership.

	• I need more bus lanes (S)	• Parking management can free up curb space to all bus lanes. • Many parking management strategies encourage transit travel, which can justify more bus priority measures such as dedicated lanes.	• Analysis of how parking management can support bus lanes. • Analysis of ways that parking management encourages bus ridership.	• Analysis of bus lane benefits. • Analysis of how parking management can free up curb space for bus lanes.
	• I need more parking spaces for buses during idle time (S)	• Parking management can free up space for bus parking. • By increasing transit ridership, parking management can justify more bus facility investments.	• Analysis of how parking management can support bus parking.	• Examples from peer communities of how better management can provide bus parking.
Citizens	• Traffic congestion reduces the time I spend with my family (S)	• Many parking management strategies reduce vehicle trips and therefore congestion.	• Analysis of parking management vehicle trip and congestion reduction impacts.	• Traffic congestion costs • Modelling of parking management congestion impacts.
	• High rents in Luxembourg-City forced me to rent a flat outside the urban area and to commute to work (S)	• Many parking management strategies (reduced parking requirements, unbundling, improving non-auto modes) increase affordability of urban living.	• Analysis of residential parking cost burdens, and how efficient management can increase affordability.	• Parking cost analysis. • Examples of how parking management can increase affordability.
	• I have to use a car because I live too far away from my workplace to take a bike and because public transit aren't punctual and reliable (S)	• Auto commuters benefit from many parking management strategies, due to reduced traffic congestion and improved user information. • Parking management can improve travel options, for example, with bus and carpool lanes, so commuters can shift mode.	• How parking management strategies can benefit commuters. • Parking management congestion reduction benefits.	• Analysis of ways that parking management strategies can benefit commuters. • Demand for commute mode shifts (how to improve alternative modes to attract more commuters).

	• I need a car for my daily shopping and to drive the kids (S)	• Auto users benefit from many parking management strategies, due to reduced traffic congestion and improved user information.	• How parking management strategies can benefit motorists.	• Analysis of ways that parking management strategies can benefit motorists.
	• Private garages are often used as a multipurpose room to store bikes, winter tires and other stuff. The cars are parked on street. (C)	• Parking management can free up garages for other possible uses, and reduce on-street parking conflicts. For example, carsharing reduces the need to own a vehicle.	• Demand for reduced vehicle ownership, to reduce vehicle costs and free up garages for other uses. • Ways that parking management strategies help respond to these demands.	• Analysis of strategies that reduce vehicle ownership or free up garages for other uses. • Cost savings and benefits of reduced vehicle ownership and freed-up garages.
	• My private car allows me to drive to the shopping malls when I am returning from work. (C)	• Auto users benefit from many parking management strategies, due to reduced traffic congestion and improved user information.	• How parking management strategies can benefit motorists.	• Analysis of ways that parking management strategies can benefit motorists.

People sometimes assume that parking management harms motorists and residents. In fact, many strategies directly benefit motorists, for example, by ensuring that motorists can always find a convenient space when making high value trips (deliveries and passenger pick-up, urgent errands, etc.), by improving travel options, improving user information and payment systems, and improving enforcement of regulations.

Parking Management Impacts on Motorists and Residents

Strategy	Description	Impacts on Motorists and Residents
Shared Parking	Parking spaces serve multiple users and destinations.	Positive. Increases parking supply serving each destination.
Parking Regulations	Regulations favor higher-value uses such as service vehicles, deliveries, customers, quick errands, and people with special needs.	Mixed, but overall positive. Ensures that motorists making important trips can always find a convenient parking space.
More Accurate and Flexible Standards	Adjust parking standards to more accurately reflect demand in a particular situation.	Mixed. Tends to reduce convenience to motorists but reduce housing costs.
Parking Maximums	Establish maximum parking standards.	Mixed. Tends to reduce convenience to motorists but reduce housing costs.

Remote Parking	Provide off-site or urban fringe parking facilities.	Positive. Increases convenience when parking lots fill.
Smart Growth	Encourage more compact, mixed, multi-modal development to allow more parking sharing and use of alternative modes.	Mixed. Tends to reduce automobile access but improves access by other modes, and provides other benefits.
Walking and Cycling Improvements	Improve walking and cycling conditions between destinations and parking facilities, transit stops and other destinations.	Positive. Benefits motorists (more convenient access to parking), transit users (more convenient access to transit), pedestrians (better access to any destination), and dogs (dogs love to be walked).
Increase Capacity of Existing Facilities	Increase parking supply by using otherwise wasted space, smaller stalls, car stackers and valet parking.	Positive. Increases parking supply with minimal costs.
Mobility Management	Encourage more efficient travel patterns, including changes in mode, timing, destination and vehicle trip frequency.	Mixed. May reduce convenience to motorists but reduce housing costs.
Parking Pricing	Charge motorists directly and efficiently for using parking facilities.	Generally negative, but total impacts depend on how revenues are used.
Improve Pricing Methods	Use better charging techniques to make pricing more convenient and cost effective.	Positive. Improves user convenience.
Financial Incentives	Provide financial incentives to shift mode such as parking cash out.	Mixed, depending on approach. Parking cash out offers a new financial incentive that is otherwise unavailable, benefiting many commuters.
Unbundle Parking	Rent or sell parking facilities separately from building space.	Positive. It gives people who own fewer-than-average vehicles a significant financial savings.
Bicycle Facilities	Provide bicycle storage and changing facilities.	Positive. Benefits people who want to bicycle.
Improve Information and Marketing	Provide convenient and accurate information on parking availability and price, using maps, signs, brochures and the Internet.	Positive. Increases motorists' convenience.
Improve Enforcement	Insure that regulation enforcement is efficient, considerate and fair.	Mixed. Negative to violators but benefits people harmed by illegal parking.
Transport Management Assoc.	Establish member-controlled organizations that provide transport and parking management services in a particular area.	Positive. Improves parking and transportation services in an area.
Overflow Parking Plans	Establish plans to manage occasional peak parking demands.	Positive. Increases convenience when parking lots fill.
Address Spillover Problems	Use management, enforcement and pricing to address spillover problems.	Mixed. Negative to some motorists but beneficial to people harmed by spillover parking.
Parking Facility Design and Operation	Improve parking facility design and operations to help solve problems and support parking management.	Generally positive to motorists and residents.

This table summarizes parking management impacts. Many strategies directly benefit motorists, improve travel options, or benefit residents.

References and Information Resources

BA Group (2017), *Downtown Parking Strategy City of London: Appendix B Parking Management and Design Best Practices*, City of London, Canada (www.london.ca); at https://bit.ly/2CEMHQJ.

Paul Barter (2016), *On-Street Parking Management: An International Tool-kit*, Sustainable Urban Transportation Technical Document #14, GIZ and SUTP (www.sutp.org); at https://bit.ly/2JyHJt7.

Civitas (https://civitas.eu) is a network of cities dedicated to cleaner, better transport. Describes more than 800 policies and programs.

EU CORDIS Transport Projects (www.cordis.lu/transport/src/project.htm) describes research projects to promote more balanced transport.

Evidence (2017), *Parking Summary Review*, Economic Benefits of Sustainable Transport (http://evidence-project.eu); at https://bit.ly/2PfII3M.

European Program for Mobility Management (www.epomm.eu) is a network of European governments engaged in Mobility Management.

GIZ (2012), *Sustainable Parking Management*, Transfer Project (http://transferproject.org); at https://bit.ly/2AdQdzV.

Michael Kodransky and Gabrielle Hermann (2011), *Europe's Parking U-Turn: From Accommodation to Regulation*, Institute for Transportation and Development Policy (www.itdp.org); at www.itdp.org/europes-parking-u-turn-from-accommodation-to-regulation.

Todd Litman (2017), *Parking Management: Comprehensive Implementation Guide*, VTPI (www.vtpi.org); at www.vtpi.org/park_man_comp.pdf.

MAPC (2010), *Parking Issues and Questions*, Metropolitan Area Planning Council (www.mapc.org); at www.mapc.org/resource-library/parking-issues-and-questions.

Giuliano Mingardo (2016), *Articles on Parking Policy*, PhD Dissertation, Delft University of Techonology; at www.verkeerskunde.nl/Uploads/2016/11/ProefschriftGiulianoMingardo.pdf.

Rachel Weinberger, Mark Seaman and Carolyn Johnson (2008), *Suburbanizing the City: How New York City Parking Requirements Lead to More Driving*, University of Pennsylvania for Transportation Alternatives (www.transalt.org); at www.transalt.org/files/newsroom/reports/suburbanizing_the_city.pdf.

Tom Rye (2010), *Parking Management: A Contribution Towards Livable Cities*, Module 2C, *Sustainable Transportation: A Sourcebook for Policy-Makers in Developing Countries*, Sustainable Urban Transport Project – Asia (www.sutp.org); at https://bit.ly/2EGm4eC.

Parking Reform website (www.parkingreform.org) promotes various reforms, particularly efficient parking pricing.

Push and Pull (http://push-pull-parking.eu/index.php?id=57) website provides information on European parking management programs.

Rachel Weinberger, et al. (2013), *Parking Guidebook for Chinese Cities*, Institute for Transportation and Development Policy (www.itdp.org); at https://bit.ly/1SeHiyl.

Steven Spears, Marlon G. Boarnet and Susan Handy (2014), *Policy Brief on the Impacts of Parking Pricing Based on a Review of the Empirical Literature*, California Air Resources Board (http://arb.ca.gov/cc/sb375/policies/policies.htm).