

Limiting free parking spaces in cities

In a nutshell

SUMMARY
It is best practice to limit on-street free parking spaces (i.e. free of charge) in urban areas and remove minimum parking requirements (for on-street parking and underground garages) in new building developments. Additionally, a formal policy to incrementally remove any previous parking requirements (for on-street parking and underground garages) from existing developments can also be adopted. Limiting on-street free parking spaces is a disincentive to privately owned cars. These measures are most effective when accompanied by measures to improve the availability and reliability of valid alternatives to the use of a car, such as public transport, cycling and walking.
Target group
Public administrations responsible for mobility and/or public transport in their territory
Applicability
This BEMP is applicable to all local authorities and specifically relevant for cities with high traffic congestion and air pollution or underused public transport.
Environmental performance indicators
<ul style="list-style-type: none">• Modal share of journeys (% of journeys made by car, motorbike, public transport, cycling and walking)• Percentage of available parking spaces during business hours (%)• Existence of minimum parking requirements (for on-street parking and underground garages) for new developments (y/n)
Benchmarks of excellence
<ul style="list-style-type: none">• On-street parking spaces are between 80 % and 90 % occupied during 90 % of business hours• The city has no minimum parking requirements (for on-street parking and underground garages) for new developments and has a formal policy to incrementally remove any previous parking requirements from existing developments

Description

Travel with individually owned automobiles is an enormously space-consuming form of mobility because each car requires a parking space at the place of origin and at the destination. In the general case where street parking is available on publicly-owned land, and therefore managed by the municipality, free parking options (or cheaper parking than private car parks) are often available. Minimum parking requirements, i.e. mandating a minimum number of parking places in office or residential buildings, are also commonplace local regulations. It can therefore be considered that many cities have an overabundance of under-priced parking considering the overall allocation of this publicly-owned resource compared to other transport modes. When driving to a destination, people rarely have to consider whether parking will be available—chances are it will be available and free, often making driving the most appealing and practical option.

Where parking space is provided free of charge, the cost of car use is effectively subsidised at the expense of the wider public, including people who do not drive. Free parking on public space does not mean parking without cost to anyone; on the contrary, parking costs not paid directly by drivers occupying the parking space are instead subsidized through tax-

payers' money and absorbed into the prices of housing, goods, and services. People pay for parking not in their roles as motorists, but rather as consumers, workers, residents, i.e. direct and indirect taxpayers. When the cost of parking is bundled with other costs, no one can save money on parking by using less of it. In effect, under-priced parking skews travel choices towards more cars and away from public transit, cycling and walking at the expense of the general public. Abundant free parking contributes to high demand for cars because it reduces the cost of car ownership. "Free" parking is not a manifestation of the freedom to circulate either, because the space is monopolised by a single car at the expense of other uses by the community. Therefore "limiting free parking", while initially unpopular, is rather a fairer use of public resources.

The use of private cars is therefore subsidised by free / cheap parking and minimum parking policies; assuming that the municipality considers that the externalities generated by car usage are negative (the harmful environmental and space-planning effects of automobile dependency are well-documented), it should aim to reduce this subsidisation and instead correct the balance by increasing the relative costs of car usage (ideally redirecting the revenues towards more environmentally friendly modes) and therefore reap the environmental benefits of successful strategies to limit car usage.

Parking is a key influence in the travel decisions that people make. When parking spaces are limited and provided at a relatively high cost, there will be a disincentive to drive everywhere. When cars are the dominant mode of transportation, many spaces are needed to accommodate them at each destination and minimum parking requirements are often instated to cope with the perceived demand. Parking spaces are spaces that are deprived of other uses. Commercial parking lots may be nearly full during business hours, but vast empty lots of asphalt and wasted space during off-hours. The land used for parking bears an opportunity cost which is not always fully accounted for when the land is managed by public authorities.

Parking availability and parking prices are highly political issues. Quite often, public administrations may feel compelled to ensure plenty of free or low-cost parking as alleged precondition for vibrant commercial activities. In many cases, public authorities embrace the polluter-pays principle in general, but still shy away from applying this logic to the price of parking because of the challenge of adjusting the price flexibly to the permanently fluctuating demand, space availability, and pollution levels.

The City of Los Angeles's Department of Transportation met this challenge with a flexible, demand-responsive pricing system called LA Express Park which was deployed in downtown LA in 2011. The scheme includes a system for detecting and managing the availability of on-street parking with smart parking meters that respond to demand by changing their prices according to location, time of day, and day of the week. The system thus ensures that scarce parking resources are better used. LA Express Park also makes finding a parking spot easier, thus reducing the number of cars circling around the block in search of a free parking space. Although parking fees may initially be met with some objections, parking meters with revenue that goes towards improving the local community tend to be well-received in the long run. Beyond the obvious benefit of reducing vehicle trips and making it easier to find a parking space, limiting free parking and eliminating minimum parking requirements reduces air pollution, lowers oil consumption, and eases congestion.

Higher prices for on-street parking and the abolishment of minimum parking requirements are two strategies that go hand in hand, producing synergies to improve parking in cities and achieve environmental benefits as a result. The next section will address parking pricing, followed by a section focused on minimum parking requirements.

Parking pricing

On-street parking tends to be free or relatively inexpensive, while off-street parking (generally privately-owned) tends to cost more, which compels drivers to cruise the streets to look for on-street parking, rather than opting to pay for off-street parking. When the difference in fees between on- and off-street parking is so great, on-street parking becomes overcrowded and the roads become congested with cars circling in search of an on-street parking space. According to a study of a 15 block area in Manhattan, finding an on-street space took an average 3.1 minutes with an average cruising distance of 0.37 miles. In a year, cruising for under-priced parking in this 15 block area alone creates about 366,000 excess vehicle miles of travel (equal to 14 trips around the earth) and 325 tons of CO₂ (Shoup, 2011a). Significantly raised on-street parking fees mean that motorists spend less time looking for parking, thus saving fuel and time, and avoiding contributing to congestion as they cruise for a parking spot.

Charging parking fees gives people more accurate economic information to decide whether they want to pay for parking or choose another means of travel, rather than indirectly paying for parking that is bundled with other costs. Reducing the difference in fees for on-street and off-street parking, aiming for a price figure that is the lowest price a city can charge and still have one or two vacant spots per block, will decrease the relative appeal of on-street parking and thus limit the congestion associated with cruising in search of a free spot. Demand-responsive pricing is an effective way to ensure that the fees are neither too low nor too high, but more simple measures that reduce abundance of free parking are also useful. Ideally the fee will, not as a goal but as a by-product, raise revenue to improve the local community, while ensuring that not

all parking spaces are occupied at all times. This is further expanded upon in the Operational data and Economics sections.

Parking requirements

To truly limit the negative impacts of parking and the instance of people even choosing to travel by car, minimum parking requirements must be abolished. Minimum parking requirements were instituted to move parked cars off the streets and alleviate the street parking demands that congest and burden neighbourhoods. Underground parking or dedicated parking structures were viewed as a way to mitigate parking demand, but their abundance not only increased demand, but also changed the way people travel, the way cities are built, and how much energy is consumed. Now cities around the world have policies that force developers to designate vast amounts of space for the car; for parking, for roads, et cetera. Local authorities often require developers provide a minimum number of parking spaces per building/development. Such policies lose sight of the needs of people and tend to prioritise space for cars over pleasant environmental ambiance for the people in them, or the people who can choose other means of transport.

Minimum parking requirements displace the question of who should pay for car parking and increase the cost of housing, as well as goods and services. It tends to distort the economic choices made by developers, landlord and tenants of the buildings subject to these regulations. When the developer pays, it means that the costs will be passed on either to those parking, or those using other spaces in the building. If the building is leased out to commercial spaces, the shop owners will pay higher rent, which in turn is passed on to higher costs for customers, regardless of whether they arrive by car or by other means. As an example if the space is used by a restaurant, the cost will be included in the menu prices, and everyone will pay more for their meal regardless of the means by which they travelled to get there.

Minimum parking requirements are not easy to establish and are often arbitrary. They are based on the unreasonable assumption that the demand for parking does not depend on its price (Shoup, 1999). A common miscalculation in urban planning involves calculating the need for parking based on peak hours in a situation in which parking is free, which is inflated and not representative of demand if parking were appropriately priced. This means that such plans are basing projections on the peak demand for free parking. These requirements, supported by little or no empirical evidence, create an oversupply of parking spaces. Though there is little basis for minimum parking requirements, they tend to be rigidly enforced, placing limits on how land and buildings are used. Removing minimum parking requirements is not the same as forcing limits on parking availability; it merely gives housing developers and businesses the flexibility to decide how much parking to provide.

In short, when parking is saturated and there seem to be not enough spaces to meet demand, the solution is to price curb parking rather than to mandate off-street parking. In the long run, cities should therefore adapt their parking management strategy both by managing the on-street parking supply, and removing minimum parking requirements. The environmental benefits will be manifold.

Environmental benefits

Car traffic is a significant source of harmful emissions and pollution. Parking fees and limited parking spaces reduce incentives for driving. A decrease in driving leads to less pollution and congestion, thus improving both environmental health and ambiance. A good parking policy can serve as a powerful tool for improving not only traffic congestion and modal split, but also land use and energy efficiency. Other environmental benefits resulting from driving include less air pollution, oil consumption, and traffic congestion. Environmental benefits from allocating less space for car parking includes reduced pressure on scarce space resources, freeing space for other uses such as parks, which promote better air quality and biodiversity.

The implementation of parking fees can result in a variety of travel behaviour responses, with resulting environmental impacts. Changes in driving behaviour and modal choice can have a profound effect environmental quality, as people drive less and drive differently (e.g. parking farther away from their destination, where parking may be less expensive or more available) when (free) parking is limited.

Implementing metered parking diminishes parking demand. Meanwhile, controlling parking supply by lifting minimum parking requirements diminishes the condition for every building to provide parking and liberates land for other uses. More people travel by car when parking is free, as it can make driving appear to be an inexpensive option. In a UK-based study, doubling parking fees resulted in a 20% reduction in car usage, and cutting the parking supply in half led to a 30% drop in car use (ITDP, 2011b).

Metered parking increases the turnover of parked vehicles by ensuring that drivers will not remain in a parking space for more than a few hours. Professor Donald Shoup (University of California, Los Angeles) calculates that the ideal parking

prices will create a turnover that keeps 15% of spaces vacant at any given time, or one or two available on-street parking spaces per block. This level of availability would alleviate the need to cruise for parking, a search that can take several minutes and can be responsible for a significant portion of all street traffic (Shoup, 2011b). The number of vehicle kilometres travelled due to searching for an available space dropped by two-thirds when Vienna introduced parking fees (ITDP, 2011). The decrease in trips taken and kilometres travelled translates to less vehicle emissions.

Some cities have addressed the issue by directly linking emissions to parking policy. For example, several boroughs in London have introduced parking pricing schemes based on vehicle emissions. Vehicles that emit the most CO₂ per mile pay the highest residential parking fees, while electric vehicles may park for free. Such schemes incentivize the replacement of polluting cars with low-emission vehicles as a means to improve air quality and address climate change issues. In France, parking fees are seen as an efficient measure to reduce car traffic and reduce greenhouse gas emissions every year nationwide (ITDP, 2011).

Parking regulation has great potential to serve in improving air quality in urban areas. If measures limiting parking are implemented, car trips to that location will likely decrease over time, as will the incentive to own a car. The demand for parking is not fixed as a universal constant but a function of individual cities' or even neighbourhoods' particular structures and options. From this follows that parking requirements are not universal either but can be adjusted to suit a city's (and its citizens') ambition.

Side effects

Parking policy involves various stakeholders at the local level, including public administrators, experts, industry and commercial organisations, representatives from the transport sector, building developers, and consumers. It is closely linked to land use and has a direct impact on public revenue and traffic congestion. Its intended environmental effects are usually to limit traffic congestion and pollution, or to free up land for more effective uses.

When redesigning an area to have fewer parking spaces, a holistic planning approach is essential. In the process of repurposing land that was previously dedicated for parking, it is important that the impacts of the construction be carefully considered so as not to add further disruption and pollution to the surrounding environment. In addition, the area must be accessible by other means when the parking spaces are removed and replaced, otherwise people will simply go elsewhere and create congestion in other areas.

An unexpected challenge Los Angeles faces with respect to the implementation of LA Express Park is the abuse of disabled parking placards. In California, 11% of drivers have disabled placards. Disabled placards, which are relatively easy to obtain, allow unlimited free parking at all meters. Their owners can park for free all day, thus limiting parking space turnover while not providing any payment for the occupied space. This unanticipated response to higher parking prices counteracted the intended environmental benefits of less pollution from cruising.

To maximise the potential that the aforementioned environmental benefits are achieved, it is important that city administrators consider the most likely travel responses to changes in parking policy and put in place complementary measures to mitigate the potentially damaging cross-media effects.

Applicability

The following points are indications of conditions under which parking regulations are applicable:

- **A parking problem exists:** If parking spaces are frequently vacant or constantly occupied, this is a good indication that a re-evaluation of pricing is in order. Parking "spillover" is a problem that is erroneously addressed by increasing supply. More likely, a necessary course of action requires the removal of some parking spaces or areas altogether. Minimum parking requirements respond to demand without controlling supply. If minimum parking requirements are in place, this is a good indication that a city needs to reconsider and improve its parking management.
- **Traffic congestion and pollution are significant problems:** Drivers tend to circle in search of parking in the limited vicinity of high-demand. This extra cruising in search of parking accumulates to have a noteworthy impact on traffic congestion and air pollution. Congestion can be significantly reduced by reducing incentives to drive and by taking up parking pricing as a measure to even out the spread of parking demand.

- **There is existing or potential infrastructure to support other modes:** If parking is limited, the effects of the measure will be much greater if other modes cannot absorb some of the people who no longer travel by car. For this reason, it is recommended that a parking management plan be part of a package of mobility measures. If parking is to be limited, there must be clear alternatives modes of transport in place that provide sufficient capacity, reliability and convenience. The preparation and adoption of a Sustainable Urban Mobility Plan (SUMP) provides the appropriate process for engaging stakeholders and assessing the suitability of complementary or alternative transport measures.
- **Land values and parking facility costs are high:** As space in downtown areas is often limited and highly valued, the allocation of a significant portion of that space to serve as parking lots is a loss of space for other uses. Eliminating minimum parking requirements allows compact development and is helpful in eliminating sprawl. Property prices will also be more affordable when parking costs are unbundled from housing. Saturation of the reduced number of parking spaces can be avoided by a pricing scheme.

Economics

Economic aspects of managing the allocation of urban public space to car parking and optimising pricing for parking can be differentiated into three basic categories:

Table 2: Economic aspects of managing the allocation of urban public space to car parking

Expenses	Savings	Revenues
<ul style="list-style-type: none"> • Research and development • Infrastructure costs associated with repurposing parking spaces • Overhead and management 	<ul style="list-style-type: none"> • Parking prices no longer bundled or hidden in other costs (for renters / customers) • Parking lot maintenance no longer required • Limit construction costs of repurposed spaces as they make use of an existing facility 	<ul style="list-style-type: none"> • Increased usage intensity of remaining parking spaces, which creates revenue if parking is priced • Potential revenue from new rental units/commerce spaces in place of former parking structure/lot

There are numerous benefits (savings and revenue) that balance and often outweigh expenses. Providing parking spaces is expensive. The cost of building a single car parking space can range between €10,000 and €40,000. A high minimum parking requirement can thus make new developments more expensive, which in turn raises the costs for property owners and renters. Property developers can easily save hundreds of thousands of euros if they are not required to build car parking spaces.

Eliminating minimum requirements frees up space for other uses, such as more bicycle parking, which in turn can also draw more customers to areas of commerce. A study in Melbourne indicates that removing parking spaces to allow better accessibility for other modes is beneficial to business. On a shopping street in Melbourne, the average cyclists' expenditure was measured to be 73% of a car user's, however the space required to for bicycle parking was only 12% of the space required for car parking. Thus, each square metre of space allocated to cars brought \$6 per hour in expenditure, whereas each square metre designated for bicycle parking brought \$31 per hour; five times as much. (Lee, 2008)

Table 3: Measures for optimising pricing for parking

Expenses	Savings	Revenues

<ul style="list-style-type: none"> • Research and development • Procurement of equipment for parking meters • Customer support • Overhead and management • Maintenance 	<ul style="list-style-type: none"> • Reduction of driving time / time spent cruising for parking • Parking prices no longer bundled or hidden in other costs (for renters/customers) 	<ul style="list-style-type: none"> • Revenue from parking meters • Increased usage intensity and revenue per space • Higher turnover of customers to commerce districts, more purchases made
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Many of the imagined costs of abolishing free parking turn out to be exactly that: imagined. For example, when higher parking prices are instituted, local businesses may fear a drop in commerce. On the contrary, eliminating free parking as an option will increase the turnover of people coming by car, since they will be paying for the time they spend parked. Introducing or raising fees for parking will not scare away customers, and the benefit to having demand-responsive pricing is that if the price is prohibitively high, it will automatically be adjusted until it is low enough that people are willing to pay again. When LA Express Park was implemented, the average price of parking decreased by 11%, while the income from meters went up by 3% and paid hours for parking meters increased by 16% due to an increase in demand in previously low-demand areas (Ghent, 2014).

Innovative pricing measures are especially beneficial from an economic perspective because they always respond to demand. During a recession, prices may go down to keep customers coming. When demand rises and spaces become too routinely occupied, prices will go up, ensuring that a turnover of customers continues. This will help businesses survive and prevent job losses.

Empirical research shows that performance-based prices will promote a faster turnover of vehicles because drivers will pay for the duration of their parking time. Furthermore, occupancy-based on-street parking prices will motivate more people to carpool. Both of these are good for businesses, as it will deliver more people to restaurants, shops, and other places of commerce. (Shoup, 2011a).

Driving forces for implementation

While parking management is usually implemented to achieve many goals, the primary driving force tends to be to make finding a parking space easier. The consequences of such an achievement are reduced pollution and reduced congestion, two major priorities of cities. Good parking management increases the availability, but not the amount, of parking.

The typical UK driver spends 106 days of their life searching for a parking space (The Telegraph, 2013). The amount of congestion and pollution caused by cars in search of a parking spot is staggering. In most cities the need for parking spaces exceeds the available space. Parked cars dominate the appearance of streets and impair their ability to function.

Not only does instituting demand-responsive pricing limit the amount of car traffic and thus, the amount of congestion and pollution, it also raises funds the benefit the local community. Meanwhile, limiting the abundance of parking in general encourages the development of people-friendly public spaces as people become less inclined to arrive to destinations by car, and rather travel via other means.

Cities are interested in enhancing the quality of life of their citizens and offering them a pleasant environment in which to live. If cities are committed to providing affordable housing, unbundling parking from housing is mandatory. Bundling parking with living space significantly raises the cost of urban life. Adjusting land and building codes to eliminate minimum parking requirements will significantly affect the overall cost of a unit (Hurd, 2014). When cities are faced with traffic congestion problems—and most cities are—it is important that local authorities play an active role in improving the situation. The effects of limiting (free) parking spaces make an urban area a more attractive place in which to live and work.

In the case of Los Angeles, the main driving force for introducing LA Express Park was the award of a \$290 million grant to the city, with \$15 million toward parking, and a heavy commitment to new technology by the city management (Ghent, 2014). The availability of funds facilitated the city's pursuit of acquiring the innovative technology necessary to achieve the vision of an efficient, functional, demand-responsive parking scheme. Such an undertaking is applicable in any city where parking is free, where parking spaces are abundant, and where automobile congestion is a problem. Where many people

want to use a scarce public resource, self-restraint does not produce any individual reward.

Parking is not at the forefront of the public's, or even planners' minds when it comes to addressing traffic problems and urban sustainability issues. As a result, it is not sufficiently recognized nor prioritized as a way to limit automobile dependence and the resulting traffic congestion problems. Nonetheless, limiting free parking spaces should be seen as an essential step in developing a sustainable urban mobility plan. Transport is one of the main sectors responsible for air pollution in many cities. Proper parking policy is one fundamental step toward solving pollution issues in cities.

Reference organisations

Cities optimising parking pricing:

- Budapest - http://www.budapest.com/travel/getting_around/parking_in_budapest.en.html
- Burgos - <http://www.civitas.eu/content/parking-strategy-and-management-burgos>
- Calgary - https://www.calgaryparking.com/web/guest/cpa_secure/parkplus
- London - <http://www.cityoflondon.gov.uk/services/transport-and-streets/parking/where-to-park/Pages/Where-to-park.aspx>
- Los Angeles - <http://www.laexpresspark.org/>
- Madrid - <http://www.civitas.eu/content/madrid>
- San Francisco – <http://sfpark.org/>

Cities efficiently managing the allocation of urban space for parking:

- Berlin - http://www.tdm-beijing.org/files/news/Parking%20Workshop/3---HeinrichsParking_problems_and_solutions_in_Germany.pdf
- Birmingham - <http://www.birmingham.gov.uk/carparkingspd>
- Graz - <http://www.parken.graz.at/>
- Hamburg - <http://www.itdp.org/europes-parking-u-turn-from-accommodation-to-regulation/>
- London - <http://www.london.gov.uk/priorities/planning/publications/the-london-plan>
- Paris - <http://www.itdp.org/europes-parking-u-turn-from-accommodation-to-regulation/>
- Tokyo - http://cleanairinstitute.org/download/rosario/gp1_2_03_paul_barter.pdf
- Toulouse - <http://www.civitas.eu/content/toulouse>
- Zurich - www.stadt-zuerich.ch/parkplatzkompromiss

Technology and projects

Merge: Xerox developed this award-winning parking bay sensor system for Los Angeles and now offers the technology to cities around the world. The system uses parking occupancy data it collects to obtain and respond to a complete view of parking demand and behaviour. The algorithm-driven pricing model sets prices based on this supply and demand data. Further information: <http://www.acs-inc.com/br-tsg-merge-parking-management-system.pdf>

SchlauerParken: an effective, low-cost system that gives an overview of inner-city parking spaces in real time. Thomas Hohenacker developed this parking sensor system and an app to match. Its special feature is that the sensors are above the road, attached to street lights for example, and are not placed in the parking bays. Further information: <http://www.schlauerparken.com/SchlauerParken.html>

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