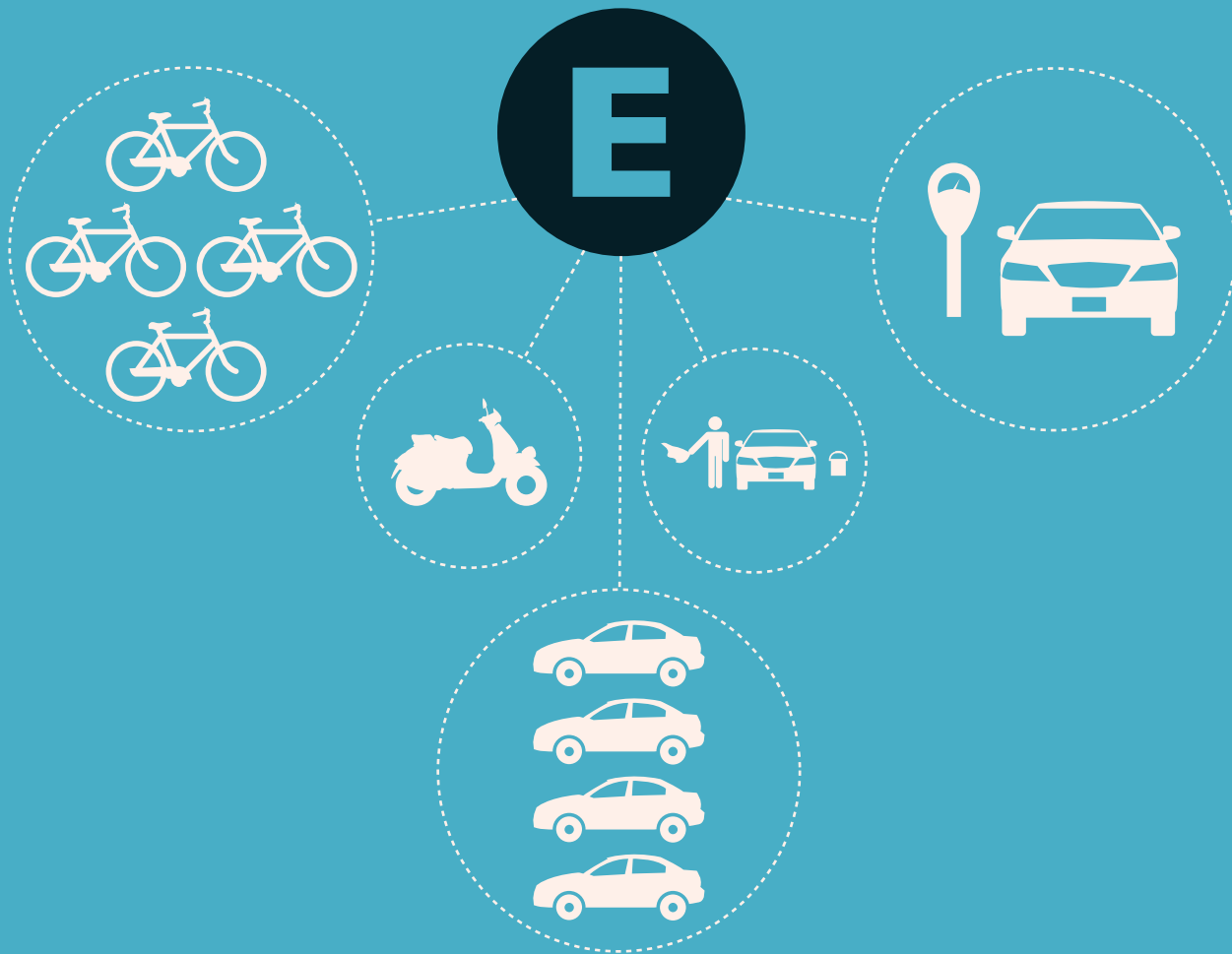


PRACTICAL GUIDEBOOK

PARKING AND TRAVEL DEMAND MANAGEMENT POLICIES IN LATIN AMERICA



Inter-American Development Bank

PRACTICAL GUIDEBOOK:

PARKING AND TRAVEL DEMAND MANAGEMENT POLICIES IN LATIN AMERICA

COORDINATED BY:

Ramiro Alberto Ríos

Vera Lucia Vicentini

Rafael Acevedo-Daunas

PREPARED BY:

Despacio and Institute for Transportation
and Development Policy (ITDP)

JEL Codes: O18, R41, R42

Key Words: *Urban transportation,
Demand management, Parking.*

**Cataloging-in-Publication data provided by the
Inter-American Development Bank
Felipe Herrera Library**

Practical guidebook: parking and travel demand management policies in Latin America / coordinated by: Ramiro Alberto Ríos, Vera Lucia Vicentini, Rafael Acevedo-Daunas ; prepared by Despacio and the Institute for Transportation and Development Policy (ITDP).

p. cm. – (IDB Monographs ; 151)

Includes bibliographic references.

1. Urban transportation policy—Latin America—Case studies. **2.** Urban transportation—Latin America—Case studies. **3.** City traffic—Latin America—Case studies. **I.** Ríos Flores, Ramiro Alberto, coordinator. **II.** Vicentini, Vera Lucia, coordinator. **III.** Acevedo-Daunas, Rafael, coordinator. **IV.** Despacio. **V.** Institute for Transportation and Development Policy. **VI.** Inter-American Development Bank. Transport Division. **VII.** Series.

The opinions expressed in this publication are those of the authors and do not necessarily reflect the views of the Inter-American Development Bank, its Board of Directors, or the countries they represent. The unauthorized commercial use of Bank documents is prohibited and may be punishable under the Bank's policies and/or applicable laws.

Copyright © 2013. Inter-American Development Bank. All rights reserved; may be freely reproduced for any non-commercial purpose.

Inter-American Development Bank
1300 New York Avenue, N.W.
Washington, D.C. 20577
www.iadb.org

Publication code: IDB-MG-151

IDB CONTACTS

Ramiro Alberto Ríos - rarios@iadb.org

Vera Lucia Vicentini - verav@iadb.org

PREPARED BY

Despacio:

- Carlosfelipe Pardo
- Carlos A. Moreno
- Patricia Calderón Peña

Institute for Transportation and Development Policy (ITDP):

- Michael Kodransky
- Bernardo Baranda
- Xavier Treviño
- Andrés Sañudo

CASE STUDIES PREPARED BY

Argentina:

Clara Rasore, Andrés Fingeret (ITDP Argentina),
Gabriel Weitz, Mariel Figueroa (STS Rosario)

Brazil:

Danielle Hoppe y Clarisse Linke (ITDP Brazil)

Chile:

Claudio Olivares Medina (Despacio)

Colombia:

Carlos A. Moreno, Jorge Iván Ballesteros, Dorancy
González, Carlosfelipe Pardo y Dilia Lozano
(Despacio)

México:

Andrés Sañudo y Xavier Treviño (ITDP Mexico)

PHOTOGRAPHY

Carlosfelipe Pardo, Carlos A Moreno, Jorge Iván
Ballesteros, Danielle Hoppe, Claudio Olivares
Medina, Clara Rasore, Luciano Acquaviva.

ACKNOWLEDGMENTS

Alexander Hutchinson and Eirin Kallestad, for their
contribution to the development of this guide.

GRAPHIC DESIGN

Claudio Olivares Medina (Bicivilízate)

TABLE OF CONTENTS

List of abbreviations	5
Executive Summary	7
The Need For Managing Travel Demand And Implementing	
Parking Policies In Latin America	13
Travel Demand Management As A Sustainable Urban Transport Policy	16
General Travel Demand Management Policies	20
Parking Policies: General Guidelines	27
Key Examples Of Parking Policies Around The World	35
Current Situation In Latin America	45
Overview Of Travel Demand Management In Latin America	47
Travel Demand Management In Latin America	49
Challenges In Parking Policies	61
Parking Policies In The Region	67
Additional Noteworthy Policies	87
Challenges in Latin America	91
Lessons Learned	94
References	97

LIST OF ABBREVIATIONS

ALS	Area Licensing Scheme	PIM	Comprehensive Mobility Plan (<i>Plan Integral de Movilidad</i>)
ANPR	Automatic Number Plate Recognition	PM10	Particulate matter
ANDI	National Business Association of Colombia (<i>Asociación Nacional de Industriales</i>)	RTM-DF	Metropolitan Transit Regulation (Mexico City) (<i>Reglamento de Tránsito Metropolitano de Ciudad de México</i>)
AZER	Regulated Parking Zone Administrators (<i>Administrador de Zonas de Estacionamiento Regulado</i>)	RZ	Restricted zones
CAGID	Central Area General Improvement District	SEDUVI	Secretariat for Urban Development and Housing of Mexico City (<i>Secretaría de Desarrollo Urbano y Vivienda del Distrito Federal</i>)
CPI	Consumer Price Index	SMT	Municipal Transport Secretariat (<i>Secretaría Municipal de Transportes</i>)
ERP	Electronic Road Pricing	TDM	Travel Demand Management
EPM	Public Enterprises of Medellín (<i>Empresas Públicas de Medellín</i>)	TfL	Transport for London
FTA	Free Trade Agreement	UNE	EPM Telecomunicaciones S.A. under its UNE Brand
GDP	Gross Domestic Product	USD	US dollars
GIZ	German Agency for International Cooperation	VAT	Value Added Tax
HOV	High Occupancy Vehicle	VKT	Vehicle kilometers traveled
IDU	Urban Development Institute (<i>Instituto de Desarrollo Urbano</i>)	WTO	World Trade Organization
IMF	International Monetary Fund	ZER	Regulated Parking Zone (<i>Zonas de Estacionamiento Regulado</i>)
ITDP	Institute for Transportation and Development Policy	ZER-C	Regulated Parking Zones – Loading (<i>Zonas de Estacionamiento Regulado de Carga</i>)
IU	In-Vehicle Unit	ZMG	Metropolitan Area of Guadalajara (<i>Zona Metropolitana de Guadalajara</i>)
NPA	National Petroleum Authority	ZMVM	Metropolitan Area of the Valley of Mexico (<i>Zona Metropolitana del Valle de México</i>)
NPTB	National Petroleum Tender Board		
OEB	Bicentenario Parking Operator (<i>Operadora de Estacionamientos Bicentenario</i>)		
OMU	Urban Mobility Observatory (<i>Observatorio de Movilidad Urbana</i>)		
PAYD	Pay as you drive		

Executive Summary

This guidebook is the result of a study carried out in 12 cities across five countries throughout Latin America (Argentina, Brazil, Chile, Colombia, and Mexico) looking at parking and travel demand management (TDM) policies. It serves two main objectives: to present the general findings of the fieldwork carried out in the focus cities, comparing their policies to similar policies implemented in other cities around the world (Europe, Asia, and North America), and to propose recommendations for implementing TDM, specifically, parking policies in Latin American cities looking to reduce traffic congestion, improve economic development, and provide greater benefits to their inhabitants.

The guidebook serves to inform various government entities, decision-making stakeholders, and transportation planners who may be considering implementation of TDM measures in their city. This practical guidebook presents the current state of TDM strategies in Latin America, analyzes global experiences, and provides ideas for improving these strategies. It also defines the basic concepts of TDM and presents the current state of measures that have been put into effect throughout the region. Additionally, it includes recommendations for effective implementation of measures to efficiently manage travel demand in a city. The guidebook also includes tools for cities to incentivize automobile drivers to use their cars less and promote shorter trips. Challenges to parking policies and the implementation of effective TDM policies will also be addressed.

The guidebook is divided into three sections. The first is an introduction to the need to implement TDM policies in Latin America and to see parking management as a preferred measure. This section provides a framework of the various policies, guidelines, and measures. It also touches on the general topic of TDM as a series of policies that seek to efficiently manage travel demand within a city. For the purposes of this guidebook, the definition of TDM includes “push” and “pull” with emphasis placed on “push measures” – i.e., measures that include tools to persuade personal vehicle users to drive less frequently and incentivize shorter trips. These specific tools are: (i) TDM as a sustainable city strategy, (ii) general TDM policies, (iii) parking policies, and (iv) key examples of parking policies and programs around the world, notably in the United States, Europe, and Asia.

The second section describes and analyzes the current states of general TDM policies in Latin America, the causes of congestion, challenges to parking policies, and the various parking policies found in the 12 cities that were studied (Buenos Aires, Rosario, Rio de Janeiro, Sao Paulo, Porto Alegre, Belo Horizonte, Santiago, Bogota, Medellin, Mexico City, Monterrey, and Guadalajara). This section provides context for TDM in the region and the causes of congestion, including: heavy fuel subsidies, tariffs, and other economic and financial incentives; large parking areas; and the uncontrolled development of roadways for vehicle use. Factors that hinder TDM are identified in this section, along with related policies that have been implemented with varying degrees of success. A description is included of the TDM policies and measures

that have been carried out in several cities throughout the region, and the current state of those policies and measures. This section also provides recommendations to improve outcomes and effectiveness. The measures and situations described are the following:

- License plate restrictions
- Congestion charges
- Car-free days
- On-street parking
- Informal parking
- Off-street parking

This section identifies the parking policies implemented in Latin America and obstacles to their effective implementation. Finally, the section introduces best practice policies that have been applied in the region, among which are requirements for bicycle parking.

The third section of this practical guidebook shares the lessons learned and recommendations for Latin America. Lessons learned refer specifically to measures that have had the complete opposite effect of the intention to reduce congestion through TDM and parking policies. The recommendations address the various obstacles encountered in applying TDM practices in general, and focus on these key implementation challenges:

- the important role of trade associations and the private sector;
- the importance of including builders and land developers in the drafting of parking policies;
- the need to balance distribution of roles among actors (private and public);
- the importance of developing effective policies, as well as coherent and updated technical capacity;
- the need to address the growing challenge of motorization;
- the need to understand and to rethink land use-based parking requirements;
- the importance of reorganizing the use of financial resources; and
- the role of international cooperation.

This report aims to present an approach for properly managing the parking supply, whether it is on-street, off-street, public, or private. The importance of this management and control approach at a district or zone level is a cross-cutting theme of this guidebook, which is complemented by the optimal use of land with a mix of commercial, retail, and residential activities. Guidelines are provided for understanding parking policies in Latin America and how to prevent the sort of problems that other cities have experienced.

The need for managing
travel demand and
implementing parking
policies in Latin America

In recent years, most Latin American countries have seen large increases in motorization, due largely to growing per capita income, which has allowed many people to buy private automobiles. Even though acquiring a car may represent a positive social status change and improvement in comfort, it actually creates negative externalities, such as greater fossil fuel consumption, higher levels of air pollution, congested roadways, and increased number of car accidents. As a result of such increase in vehicle use there is disproportionate investment supporting car-centric infrastructure at the cost of citizens- and environmentally-friendly modes of transportation.

Should these trends continue in the region, it may become practically impossible to travel in cities within reasonable time frames. Instead of prohibiting the use of personal vehicles, specific parking-related tools can be used to create positive changes in the midst of these negative trends.

This practical guidebook has two objectives. The first is to summarize the findings of the fieldwork performed in 12 cities across five Latin American countries with regard to their TDM strategies, specifically highlighting their parking policies. The analysis is compared with similar strategies from around the globe (Europe, Asia, and North America).



Figure 1. Congestion is an increasingly common phenomenon in Latin American cities.



Figure 2. EcoParq is a very successful paid on-street parking initiative in Mexico City.

The second objective of the report is to propose recommendations and guidelines for TDM (with a focus on parking policies) for Latin American cities that want to reduce traffic congestion, improve economic development, and provide greater benefits to their populations through comprehensive sustainable transportation policy. This guidebook should serve as a support document and tool for various government entities, decision-making stakeholders, and senior transportation planners developing transportation and urban planning policies and projects.

TRAVEL DEMAND MANAGEMENT AS A SUSTAINABLE URBAN TRANSPORT POLICY

It is important to mention what can be done to reduce congestion created by increasing motorization, the lack of proper urban planning, and regressive transportation policies. In general terms, this broad approach is known as “travel demand management.”

The idea behind Transportation Demand Management policies is relatively new for cities and their governments. It aims primarily to solve growing traffic and traffic-related problems through the efficient management of travel and modes of transportation available in the city rather than by building more roads.

The Institute for Transportation and Development Policy (ITDP) defines demand management as a “series of strategies aimed at changing people’s travel behavior (how, when, and where people travel) in order to increase the efficiency of transportation systems and achieve specific sustainable development public policy goals. The mobility management strategies prioritize the movement of people and goods over vehicles, e.g., efficient modes of transportation such as walking, bicycling, public transportation, working remotely, carpooling, etc.” (Medina, ITDP Mexico, et al. 2012).

TDM is an ideal tool, especially for developing countries in which economic resources are scarce and a large majority of the population uses non-motorized or public transportation. Roadways and highways built with no socio-economic or environmental considerations may affect low-income populations in particular. For example, consider the construction of a highway in a location that will divide a low-income neighborhood. This will consequently make it difficult for residents that do not own an automobile to travel by bicycle or on foot. The same situation may arise when increased motorized traffic along a road makes traveling by bicycle or on foot more dangerous and thus increases the probability of accidents.

The current situation in the region provides an opportunity to prevent these problems from growing worse and congestion from reaching unsustainable levels. Implementing TDM policies may provide solutions to the region's current state of affairs. Although many of these policies and instruments may not be entirely popular, TDM approaches can have short- and long-term impacts on transportation trends.



Figure 3. Although some initiatives for regulating parking do exist, consistency among policies is lacking.

Several Latin American countries have made efforts to implement some type of TDM tool. However, these have often been ineffective because the particular tool was not the best choice for the situation or the implementation was ill-planned and/or poorly executed.

For a TDM tool or policy to be effective, it must have both deterrents (push measures) and incentives (pull measures). For example, if a pull measure is introduced in isolation, such as promoting walking without designing the street for lower speeds, the desired objective will not be achieved. The same observation applies to introducing push measures: Effective policies consider the importance of combining both push and pull measures.

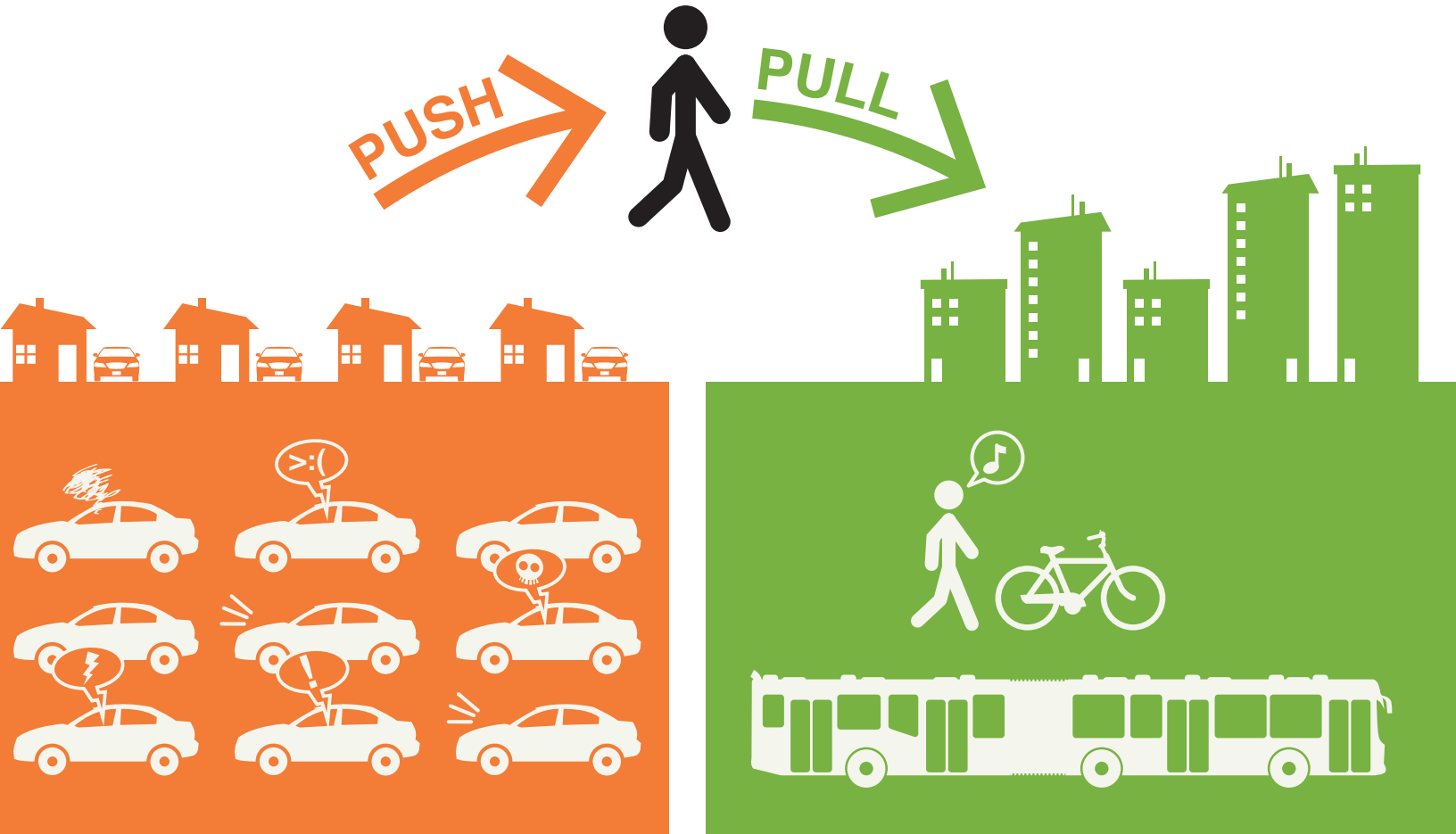
Figure 4 is a diagram of the measures commonly known as push and pull (Broaddus, Litman et al. 2009; Rye 2011; Pardo 2012). The following section details several TDM instruments, specifically push options.

Push measures:

Fuel prices, property fees, traffic fees, parking management, reduced motor vehicle use and speed, integrated land use planning, enforcement, and regulatory restrictions.

Pull measures:

Improve public transportation; bicycle and pedestrian infrastructure; citizen awareness campaigns; expand mobility options; compact urban development.



Push and Pull Measures:

Reallocating roadway space to integrate pedestrians, bicycles, and buses. Traffic light synchronization to favor non-motorized transport. Citizen engagement and marketing.

Figure 4.

Diagram illustrating push and pull strategy components of TDM. Developed based on: P. Müller, F. Schleicher-Jester, M.-P. Schmidt & H.H. Topp (1992): Konzepte flächenhafter Verkehrsberuhigung in 16 Städten", Grüne Reihe des Fachgebiets Verkehrswesen der Universität Kaiserslautern No. 24

GENERAL TRAVEL DEMAND MANAGEMENT POLICIES

TDM policies have been implemented in several countries and cities throughout the world. Below are some practices to help understand their application.

FUEL PRICES

Fuel subsidies in the region are a stimulus to private car use and incentivize longer trips. Eliminating these subsidies would stimulate the use of less polluting fuels and reduce the economic impact on the country (Otero 2009). Once these subsidies are removed, it is essential to apply additional fees such as taxes and surcharges, which would directly influence shorter trips and the efficient use of vehicles (GIZ 2011; Pardo 2012). However, fuel policies are a complicated instrument and slow to implement, given that, in most cases, the central government must be the one to adopt these measures.

The German Agency for International Cooperation¹ has carried out several studies comparing fuel (gasoline and diesel) prices by continent. This is a useful tool for understanding and comparing where fuel subsidies and fuel taxes are highest in the world. This report will provide examples of best practices and recommendations for future fuel price policies that could be implemented.

PROPERTY FEES/TAXES

This instrument aims to eliminate the tariff and financial benefits currently in place in several countries throughout the region. This is important in order to balance out the real costs of vehicle ownership and use as well as limit the number of vehicles on the road (Broaddus, Litman et al. 2009; Pardo 2012).

Singapore and Shanghai are two successful examples of the implementation of vehicle property taxes. Singapore created additional sales taxes to those already in place, which means that purchasing a vehicle in Singapore is much more expensive than, for example, in the United States.

¹ See: www.giz.de/Themen/en/29957.htm

PAY-PER-USE (URBAN TOLLS)

The primary objective of this instrument is to assign a value to the use of roadways in the most congested areas. The urban toll requires drivers to pay for roadway use, particularly in city centers and other congested areas during specific high-volume traffic hours. This measure ensures faster travel and enhanced flow of traffic in these areas. The revenue generated by this measure is usually re-invested in improving public transportation, non-motorized transportation, and public spaces (Bull 2003; City of Seattle 2008; Environmental Defense Action 2008; Broaddus, Litman et al. 2009; R. Arnold, V. Smith, J. Doan, R. Barry, J. Blakesley, P. de-Corla, M. Muriello, G. Murthy 2010; Pardo 2012).

The case studies below demonstrate the characteristics and results of the two most important cases regarding this pay-per-use measure: Singapore and London.



Figure 5.
The London congestion charge is one of the most successful in the world.

Case Study 1: Electronic Road Pricing in Singapore

The congestion charge scheme in Singapore, named the Area and Licensing Scheme (ALS), was introduced in June of 1975 and is the oldest and best-known in the world (Broaddus, Litman et al. 2009; Pardo 2012). The Scheme called for charging vehicles according to when and where they cause congestion within “imaginary” cordons drawn around the most congested areas in the city, called Restricted Zones (RZ). Revenues generated from this charge were put into a consolidated general fund, which was not specifically earmarked for transportation projects.

In order to enter a RZ, vehicle and taxi drivers purchased and displayed an area license, Monday to Saturday from 7:30 a.m. to 10:15 a.m. The license fee was US\$2.20 per day. For motor vehicles entering with a minimum of four people (carpools), there was no charge. Officers stationed at booths at the access points verified that licenses were displayed in the vehicle windshield.

Vehicles without a license could still enter, but received a US\$50 fine. Each access point provided information on alternate routes to help drivers avoid accidentally entering an RZ.

This scheme saw several iterations from its creation in 1975 until 1998, when the ALS was replaced by Electronic Road Pricing (ERP). ERP is an automated solution to monitor a number of technical aspects, including payment from all RZ users, volume of users, rate variation through the day, and entry to the various zones. It also serves to modify the daily rate, thereby preserving the spirit of the congestion charge concept on the roadways, and monitors the times and places where the problem arises.

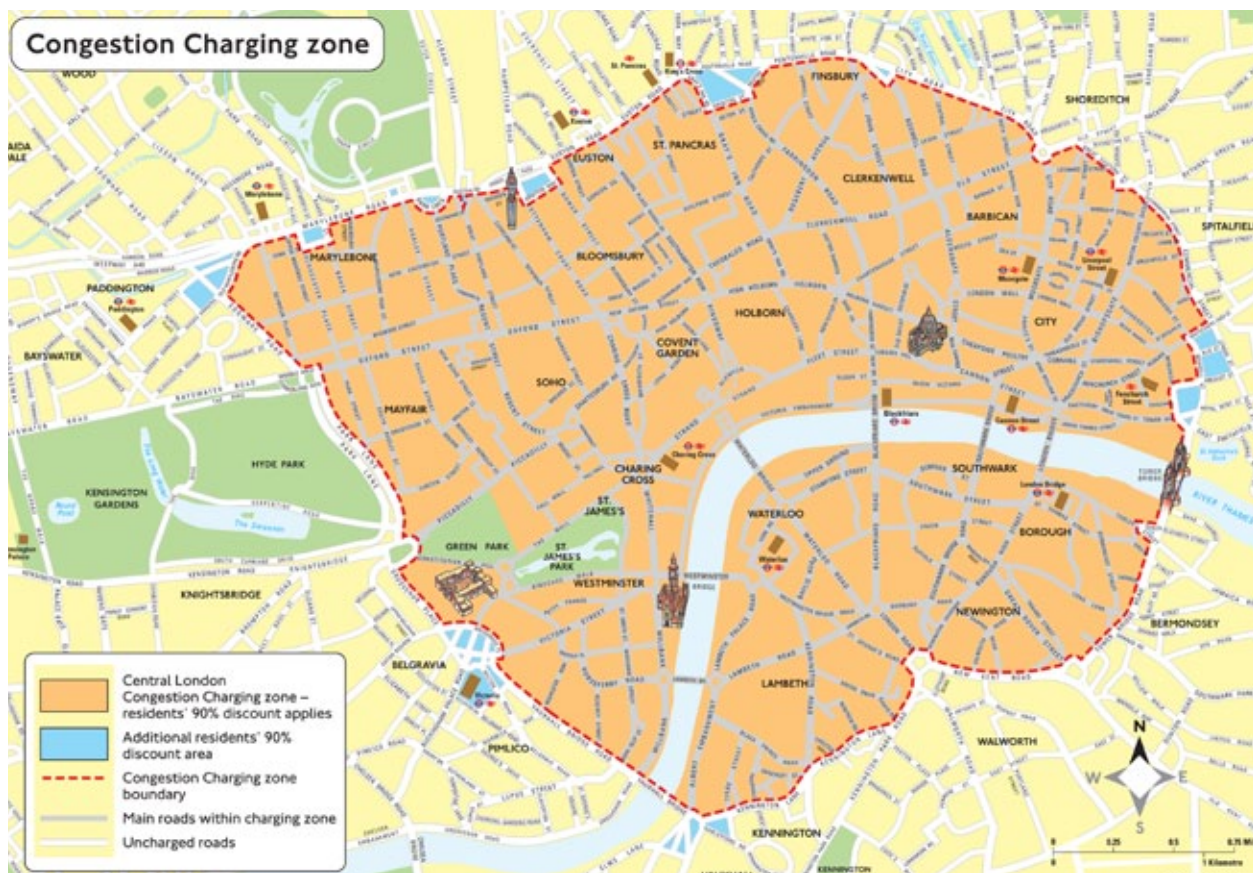
Case Study 2: Congestion Charge in London

London's congestion charge was introduced in February 2003 to address traffic congestion in the city center, which was the worst in the United Kingdom in terms of travel times (Transport for London 2005; Richards 2006; Transport for London 2010; Turner s.a.). This measure had three primary objectives: to discourage the use of private cars, reduce traffic congestion, and support investment in public transportation. This case was successful in that the charge achieved all objectives in the short term – the results were almost immediate (Broaddus, Litman et al. 2009).

This is a zone-based charge in which vehicle users pay a daily fee of £8 (US\$12) upon entry into the demarcated zone between the peak hours of 7:00 a.m. and 6:00 p.m., Monday to Friday. This zone is monitored by cameras placed at access points and throughout the zone to identify license plate numbers. Vehicles that are not registered for payment receive an automatic fine via mail.

According to Transport for London (TfL), two days after the measure was implemented, traffic levels fell 25%. Simultaneously, an additional 300 buses were added to meet the associated increase in public transit use. In 2003, during the first six months of the new scheme, TfL recorded 60,000 fewer vehicles entering the city center than the previous year. Around 60% of this reduction was due to mode shift (from private vehicle to public transportation), with approximately 30% from avoided trips to the zone, and the rest due to carpooling, reduced number of trips, increased trips outside of hours of operation, and an increase in motorcycle and bicycle use (Broaddus, Litman et al. 2009). Figure 6 shows the boundary of the congestion charging zone (Transport for London 2010).

Figure 6.
Map of the current congestion charging zone in London.
Source:
www.tfl.gov.uk/tfl/roadusers/congestioncharge/whereandwhen/



DISTANCE-BASED CHARGING (PAY-AS-YOU-DRIVE)

This is a less often used TDM measure, due mainly to challenges in implementation. Distance-based charging requires the driver to pay a fee (to the government or a private entity, such as a car insurance company) based on the distance driven in that vehicle. The logic behind this instrument is that by driving fewer kilometers there will be less wear on infrastructure, reduced risk of car accidents (Litman 2011; Pardo 2012), and other positive impacts. Distance-based charging can be seen as two instruments based on the same principles that take on different forms: one form as a payment to the government for use of the infrastructure, the other a payment to a private organization (insurance company). This kilometers-driven-reduction scheme would lower both government expenditures and the probability of car accidents, and, therefore, result in lower taxes and insurance rates for drivers.

Pay-As-You-Drive (PAYD) schemes are difficult to enforce due to the complex nature of these instruments. The most often cited challenge is developing secure and low-cost mechanisms for real tracking of the kilometers traveled per vehicle. It is, nonetheless, a useful policy example, and the technology associated with this type of tool has dropped in price considerably, which will make implementation more viable over time. Table 1 illustrates three of the main challenges to implementing this type of TDM measure, as well as some possible solutions to overcome them.

Table 1.
Challenges and possible solutions for a PAYD scheme.
Source: Litman, 2011.

CHALLENGE	POSSIBLE SOLUTIONS
Uncertainty: Insurance rates are based on claims made during the year. Although there is significant evidence that the more kilometers traveled, the higher the risk of a crash, there is no reliable information to know how exactly to calculate costs based on the trip.	It is important to start with a relatively small pilot program, using an average rate; then, adjust the rate based on needs as the pilot phase starts to provide data.
Exaggerated number of “losers”: Many people do not agree with PAYD systems because they believe it would penalize many groups, such as rural drivers, entrepreneurs, or retailers, as they travel a lot throughout the year.	Educate key actors on the distribution of the overall benefits of the PAYD system. Even those who drive long distances could benefit if they choose to have more than one vehicle. They would also benefit from reduced vehicle traffic.
Lack of incentives: Insurance companies currently have little incentive to implement innovative pricing options, such as PAYD.	It is important to provide more information to insurance companies as to the potential profits the PAYD system could generate for them. Provide financial incentives, such as tax breaks, among others.

REGULATORY RESTRICTIONS

This is a basic tool to reduce the indiscriminate use of cars through regulatory control, such as license plate restrictions. Given that this tool has only been implemented in Latin America with some initial success, it will be described in greater detail later in this document.

CAR-SHARING

Car-sharing is usually a membership-based program in which individuals or companies have the right to use a rented vehicle for a short time to make occasional trips such as weekend grocery shopping. One of the key advantages to this system is the idea of giving access to a vehicle while eliminating the need for vehicle ownership. In essence, users can enjoy many of the same benefits of a private car without the same responsibilities and costs.

As seen in Figure 7, car-sharing would be considered a mode of transportation intermediate between those who own and those who do not own a vehicle. Various studies have shown (Litman 1999; Fox, Millard-Ball et al. 2005; Colin Buchanan Consultants 2008) that car-sharing allows users to combine modes of transportation instead of depending solely on traveling by car.

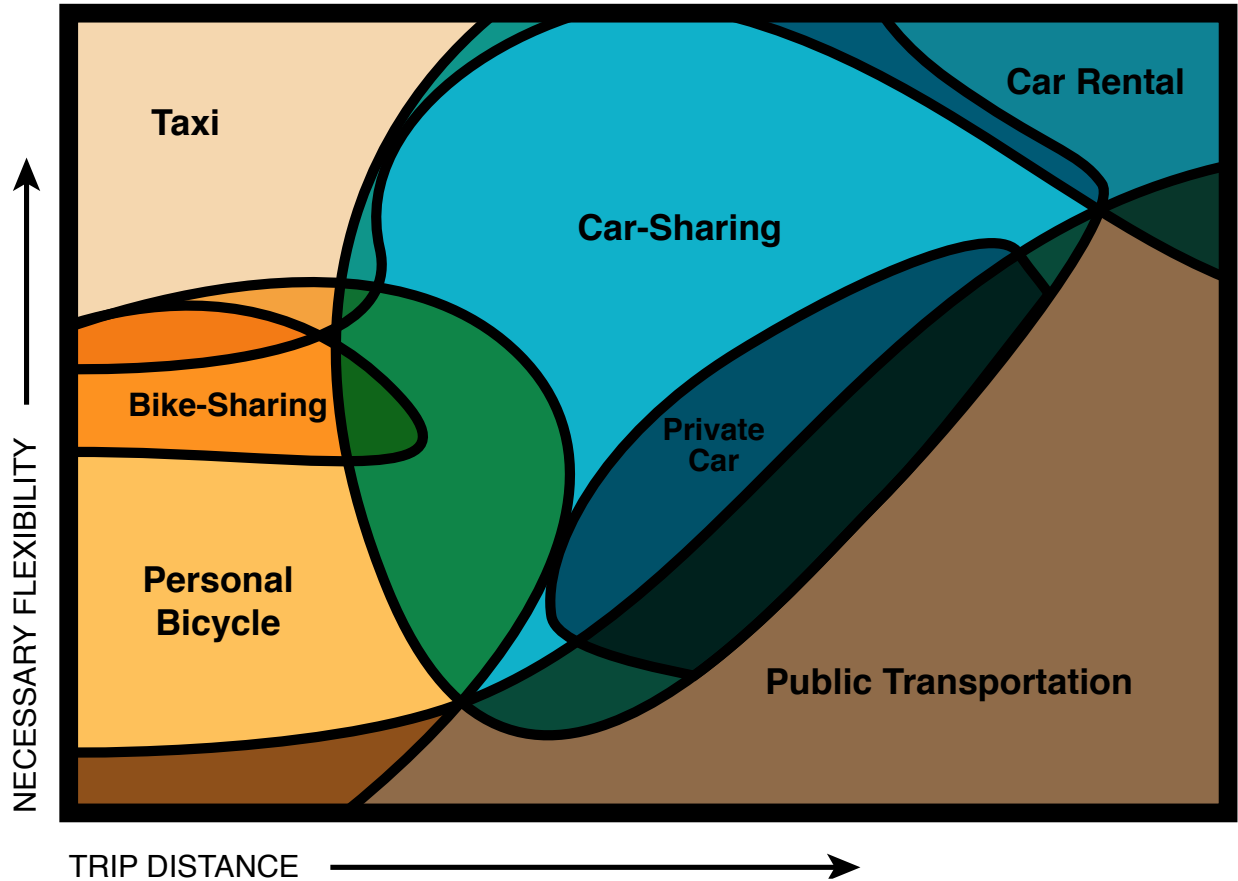


Figure 7. Car-sharing in relation to other modes of transportation. Based on: Joachim Schwartz, presentation at Car-Free Cities working group seminar, London 1999.

ENVIRONMENTAL RESTRICTIONS

This TDM instrument is somewhat similar to pay-per-use for access to roadways, although the charge is based on vehicle emissions. There are zones in the city in which only certain levels of emissions are permitted and, therefore, only cars that comply with emissions standards may enter. The aim is to phase out old gas guzzling cars and to encourage citizens to acquire less-polluting cars².

This measure has been implemented with some degree of effectiveness in Germany, where license plate restrictions correspond to a reduction in the number of polluting vehicles in certain areas of some cities. These low-emission zones (known as Umweltzonen) went into effect in 2008 in Berlin, Hanover, Cologne, and Stuttgart. Since then, dozens of German cities have implemented this policy.

² See www.lowemissionzones.eu/ for a description of the various initiatives in Europe.

PARKING POLICIES: GENERAL GUIDELINES

There must be effective management of the quantity and capacity of city parking; both on-street and off-street to implement an efficiency-oriented road-use policy (Barter 2011; Kodransky y Hermann 2011; Rye 2011). As previously noted, the higher supply of parking spaces in a city – and the less expensive they are – the higher the demand for vehicle use will be.

TYPES OF PARKING

Any effective parking policy must meet specific requirements, taking into consideration the different types of parking and that each parking type has different conditions in terms of operations, regulations, and functions. Figure 8 shows types of parking and the associated key issues to keep in mind when developing effective policies. In addition to the types of parking described below, an effective parking policy must address the various temporary parking uses (short-term, long-term, night-time, and residential). This document will analyze parking policies based on the type of parking space:

- **On-street or off-street:** determined by location on or off the public roadway (separate properties). On-street parking often reduces pedestrian space.
- **Paid on-street:** any on-street parking space requiring payment, either by regulation or informal means.
- **Free on-street:** on-street parking free of charge.
- **Informal on-street:** part of paid on-street parking, referring to any parking that has an informal service and/or fee (paid to a person who has “taken” the space and watches the vehicles parked there).
- **On-street, informal service, regulated rate:** this type of service was found in the field – even though the service is informal, a mechanism has been defined in some way to standardize the on-street parking rate.
- **Off-street:** parking that is located off the public roadway and must comply with certain regulations. May be operated by the public and/or private sector.
- **Use-based off-street:** this type of parking is primarily linked to a specific land use, such as residential or commercial (e.g., a shopping center or office building).

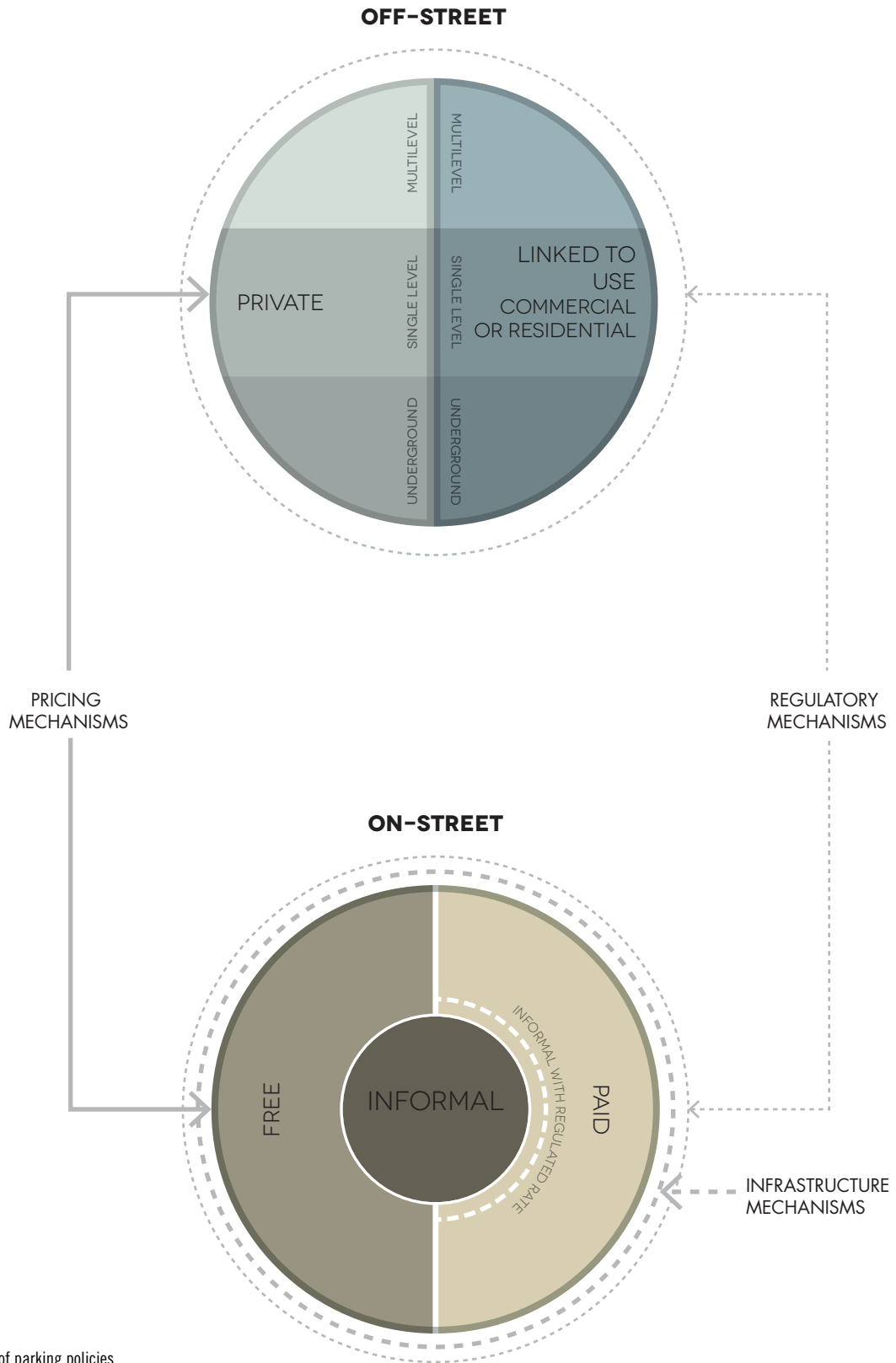


Figure 8.
Key elements of parking policies.

BASIC PRINCIPLES OF PARKING POLICIES

Kodransky and Hermann (2011) developed a series of recommendations for parking policies that are useful for understanding how to implement these policies. The key idea in these recommendations is that parking supply must be managed at the area level, not by separate land parcels. The distinctions made in this guidebook regarding the location of parking (off-street or on-street) relate to very specific characteristics, the main relevance, however, must be in the total supply of parking within a given area of a city center. Setting parking caps in such areas, in which the existing supply of parking is frozen at current levels, will dictate pricing and other issues. Restrictions to supply especially apply to areas in close proximity to public transportation stations. This is vital to supporting ridership on public transport and operational success.

Two complementary components of parking policies are prioritizing both non-motorized and public transportation and the need for clear enforcement. These components make it possible to implement a comprehensive parking policy and ensure its success.

According to Kodransky and Hermann (2011), the basic issues that must be considered in parking management include:

- Minimum parking requirements subsidize driving when costs are coupled with the sale or lease of a property.
- Increased supply of parking prevents good accessibility. With better-planned parking requirements, there can be improved conditions for walking, bicycling, and the use of public transportation since pervasive driveways and off-street facilities distort the continuity of the public realm.
- Increasing the parking supply translates to lower parking fees and drives up demand for parking.
- Demand for parking is influenced by supply, price, and alternative transportation options.
- Enforcement is a crucial component of an effective parking policy.

These issues lead to various unintended social and economic outcomes.

The **recommendations** for effective parking policies are as follows:

1. Eliminate minimum parking requirements³.
2. Establish parking caps to control total supply.
3. Reduce parking near public transportation stations.
4. Charge for on-street parking based on market conditions to ensure compliance with performance standards, such as occupancy rates.
5. Consider creating districts (areas) with parking benefits, in which fees collected from parking meters could be re-invested in the community.
6. Integrate technology into parking to offer both consumers and policy managers the greatest possible flexibility.
7. Re-purpose Street spaces from cars to more social uses, such as bicycles, bus-only lanes, wider sidewalks, or mixed-use spaces.
8. Design parking spaces that are optimally integrated into surrounding buildings and pedestrian areas, and that do not create “dead zones” or block pedestrian areas or walkways.
9. Incorporate parking policies into metropolitan transportation plans.
10. Include innovative parking management in government “livability” initiatives, transit management policies, air pollution control strategies, climate change measures, and innovative financing programs.
11. Strengthen enforcement of on-street, off-street, illegal, informal, and legal/formal parking designations.

³ The requirements refer to the number of parking spaces needed, depending on the land use to which they are associated. For example, an office building could require one parking space per 50 m² of office space. The minimum requirements set the minimum number of spaces based on the above criteria. The maximum requirements are the opposite.

KEY ELEMENTS FOR AN EFFECTIVE PARKING POLICY

Current planning of sustainable transportation systems has frequently used the categorization introduced by Dalkmann and Branningan (2007), which proposes that policies implemented to improve sustainable transportation conditions should incorporate planning, regulation, information, technology, and economic measures. This guidebook will emphasize three specific mechanisms based on these measures: pricing (part of the economic measures), regulations, and infrastructure (part of the planning measures). The various components of each mechanism are detailed below, based on the structure in Figure 8.

PRICING MECHANISMS

The prices for parking should be defined according to existing demand in a given area and the desired demand levels for that area. There are specific formulas for this purpose, which are not defined here (see Shoup [2005] for an in-depth description of this topic). Figure 9 provides a conceptual diagram of the interaction between parking demand and price.

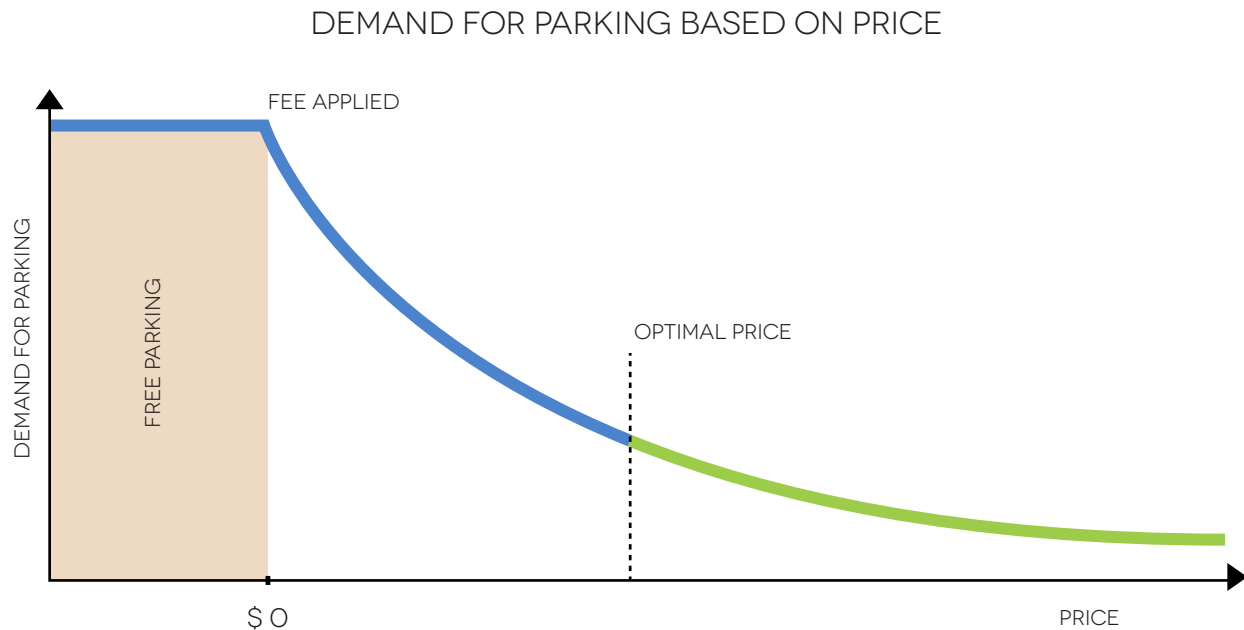


Figure 9.
Demand for parking in relation to price (conceptual chart).
Source: Prepared by the authors.

The most important aspects of pricing mechanisms, according to Weinberger, Kaehny et al. (2010), are:

- **Always define a price** for the use of a parking space; never leave price unspecified (if this occurs, informal pricing “mafias” can form and charge a fee without sharing revenue with the government for re-investment). Many cities set the price based on an occupancy rate of 85%, leaving few available spaces.
- **Charge for on-street parking:** The price for parking in relation to the number of spaces available influences travel behavior. Demand varies according to the concentration of commercial, residential, industrial, and other land uses.
- **Progressive rates:** These are rate schemes for parking on public streets that slightly increase rates over time to account for the increase in the marginal burden stemming from vehicle presence.
- **Residential permits:** The overflow from financial and commercial areas in the city center into residential areas may create a demand for residential parking permits, which should not be free. This is a way to allay residential worries in paid parking zones since their overnight and longer term needs are different from those of visitors, who stay short periods of time, and workers, who come from outside the area.
- **Workplace tax:** Companies could be required to pay taxes for the spaces provided at the workplace.
- Define price so that **85% of parking spaces in the area are occupied at any given time** (Shoup 2005).
- **Set adequate time units** depending on the zone (e.g., short-time limits or by-the-minute for high-turnover areas and longer time limits, or by-the-hour for low-turnover areas, such as residential areas).

REGULATORY MECHANISMS

The classic answer to parking issues, such as increased congestion or the “lack of parking,” has been to build more parking spaces, either on-street or off-street (multi-level, underground), or to implement looser control of parking spaces.

Although regulation is not often brought up, it is indispensable for a city's parking policy to be aligned with a city's long term sustainability plans.

The most important aspects of regulatory mechanisms, according to Kodransky and Hermann (2011), are:

- **Define a reasonable supply** for an area (instead of doing it on a property-by-property basis) and regulate that supply to ensure that the market does not exceed it.
- **Limit the parking supply:** For each off-street space created in a zone subject to the maximum limits, an equal number of on-street spaces must be eliminated. This type of “cap-and-trade” idea allows for a constant supply, while also letting on-street spaces be re-purposed.

- **Place caps on parking:** This entails having a maximum cap on parking for both old structures and new developments. Caps should be determined for the number of parking spaces permitted for homes, properties, or other housing units (or by the area in general). Unfortunately, the common practice in many places is to set a minimum requirement, which is not recommended.
- **Regulate parking locations:** The presence of vehicles in pedestrian-oriented neighborhoods can be restricted or eliminated during specific daytime hours.
- **Establish requirements based on land use** and the expected demand level.
- **Set requirements, where possible,** by area (neighborhood or zone) instead of on a property-by-property basis.
- **Always have a budget and clear enforcement programs** for the use or misuse of parking spaces (and parking fees).

INFRASTRUCTURE MECHANISMS

Several physical designs may be implemented to support parking management policies, according to Kodransky and Hermann (2011):

- **Bollards:** Install bollards throughout the city to prevent vehicles from blocking pedestrian walkways and invading public spaces. Retractable bollards, height-restriction barriers, and other types of obstacles may be used to limit access, as well as give emergency vehicles and delivery vans the flexibility they need to enter and park as necessary.
- **Stripes:** These are painted white stripes to demarcate where parking is permitted on certain streets. This is a discreet visual tool to organize parking and to distinguish the space from other functions, such as pedestrian walkways, bicycle lanes, and traffic lanes.
- **Reconversion of public spaces:** Improved visibility at intersections; reduced time necessary for pedestrians to cross intersections, thanks to expanded sidewalks at crosswalks; re-greening of public roadway landscapes; expanded space available for cafés on narrow streets; and additional benches to encourage community living. All of these alternative uses slowly reduce the overall availability of on-street parking, while also improving associated surroundings for other uses.
- **Parking environment:** If a parking lot (single- or multi-level) must be built, the site should have a façade with “human” activity (stores or other activities or uses). It should also include bicycle parking that is safe and comfortable for users, as well as other features that would make the building more pleasant and an active part of the urban setting.
- **Geometric street design:** When on-street parking spaces have not been eliminated, public roadway safety objectives can be met by orienting the parking space to calm traffic.

PARKING MANAGEMENT STRATEGIES

There are economic, regulatory, and physical mechanisms that are useful for shaping parking policies. According to Weinberger, Kaehny et al. (2010), the following are the most important.

BASIS FOR OFF-STREET PARKING

From a theoretical standpoint, it could be simple to predict the minimum parking requirements that could lead to car dependency and the degradation of pedestrian spaces within a city. Together, roadways and parking spaces create a system of supply or capacity, while the total number of vehicles used makes up the associated demand. Regulations that require new developments to include parking spaces facilitate and reduce the cost of vehicle use by reducing the cost and time associated with looking for a parking space, as well as re-accessing the vehicle when it is not parked next to the destination. Likewise, at least initially, rapid roadway capacity and roadway network expansion reduces travel times for drivers. These savings make vehicle use more economical. Once it is clear that parking supply attracts more vehicles over time and, therefore, increased demand for parking, it is easy to see that more capacity means more vehicle traffic. A common thread in research demonstrates that increasing capacity increases congestion.

BASIS FOR ON-STREET PARKING

The parking supply is essentially fixed. It may be affected by the number of blocks, restrictions, or the use of perpendicular parking. However, to a large extent, supply is more resistant to intervention, independent of driver demands and the number of facilities built.

Generally, parking is perceived as a public good and, as such, should be free. However, a true public good is one in which its use by one person does not impede the use by another person (such as a street lamp or free television service). Although street parking uses public roadways, it is clearly not a public good; each driver who occupies a parking space takes away a potential space from another driver. Likewise, the cutouts in sidewalks for residential driveways utilize public space and establish an exclusive use for the owner's entry and exit.

Parking policy is most commonly employed to: reduce illegal parking, reduce circulation while searching for a parking space – which leads to undesired congestion and increased air pollution, increase or generate revenue, mitigate disruptions in the urban fabric, and re-think land allocation among users of all types of transportation (Weinberger, Kaehny et al. 2010).

KEY EXAMPLES OF PARKING POLICIES AROUND THE WORLD

Over the last decade, some cities in the United States such as Cambridge and Portland have redesigned parking policy strategies, in consideration of the negative impacts caused by uncontrolled vehicle use, such as traffic congestion and the associated greenhouse gas emissions that contribute to climate change. These cities have opted for a general management strategies approach to establish effective control and to balance out the urban transportation system.

Below are key examples of parking policies addressing the essential elements of parking requirements and paid on-street parking.

PARKING REQUIREMENTS

Several cases of parking requirements in cities around the world:

UNITED STATES: CAMBRIDGE, MASSACHUSETTS

This city has mandated maximum and minimum parking requirements for the sale of offices, government buildings, and universities. The minimums were reduced for sites close to public transportation, sites that share parking, sites that provide affordable housing, and sites in close proximity to public or commercial parking. The planning board allows developers to exceed the maximum in cases of high demand for parking. To reach the maximum allowed, parking concessions are granted, so that developers do not have to provide the maximum permitted. Even with the maximum levels, planning agencies encourage developers to request permits for the minimum required number of parking spaces far from the roadway.

In 1998, Cambridge implemented the Travel Demand Management ordinance. This regulation sought to curb private vehicle use by ensuring that new developments better managed on-site parking and provided resources for alternative transportation, such as subsidies for public transportation passes, bicycle parking, priority parking for carpoolers, and other measures. The policy aimed to reduce trips carried out by single-occupant vehicles by 40%. The city performs annual surveys and takes inventory of parking facilities (Weinberger, Kaehny, and Rufo 2010).

UNITED STATES: PORTLAND, OREGON

In 1997, the city implemented maximum and minimum requirements for managing new parking structures, according to zone codes. They established that: “Limiting the number of spaces allowed promotes efficient use of land, enhances urban form, encourages use of alternative modes of transportation, provides for better pedestrian movement, and protects air and water quality.”

The minimums do not apply to developments in the densest commercial neighborhoods, including the city center, commercial districts, and central residential districts. These minimums also do not apply to any site fewer than 500 feet from a public transportation line that provides frequent service, at least every 20 minutes during rush hour. The builders and owners also benefit from the reduced minimums if they are willing to manage parking by providing shared spaces or bicycle parking. For every five bicycle spaces built, one fewer space is required for motor vehicle parking. The maximum parking requirement complements the minimums in many neighborhoods.

The impact of these types of programs and policies has been significant. According to the city report, the use of public transportation jumped 20% to 25% in the early 1970s and to 48% in the mid-1990s (Rye 2011).

GERMANY: MUNICH

Since January 2008, Munich has had a building ordinance that regulates accessory parking and permits non-residential land uses to provide a reduced number of parking spaces for new buildings. Representatives of residential premises may choose not to comply with the requirements by paying a special penalty. The primary areas identified in the new ordinance are:

- **Zone I:** Corresponds to the Old Town, as well as the surrounding areas to the north and south of the main train station; and
- **Zone II:** Corresponds to the borders of the inner city.

The ordinance was amended so that the number of required parking spaces provided for non-residential uses was not lower than the quantity established by Bavarian law (Munich is located in Bavaria). Depending on the zone, the number of required parking spaces for new buildings may be reduced by 25% to 50% of that stipulated in Bavarian law. Table 2 summarizes these changes (Kodransky and Hermann 2011):

Table 2.
Zones, reductions, and requirements in Munich.

LAND USE	ZONE 1	ZONE 2
Residential	100% of the required spaces must be provided or pay a 12,500 penalty	100% of the spaces required must be provided or pay a 7,500 to €10,000 penalty
Non-residential	50% reduction	25% reduction

SWITZERLAND: ZURICH

In 1966, the Historischer Parkplatz Kompromiss – literally, the historic parking compromise – was established to place caps on the parking supply. If a new space is built off-street within a zone with a defined limit, an on-street space has to be removed to maintain the supply cap. This policy has enhanced public spaces, such as the development of new public squares. Zurich also has maximum requirements based on land use (Kodransky and Hermann 2011).

ASIA: VARIOUS

Most of the major cities in Asia have established parking regulations according to land use. The regulations are diverse in design and scope. The most successful examples have been those with low parking requirements (Barter 2011).

Table 3 shows parking requirements for office and commercial buildings in several Asian cities. It is worth noting that the wealthiest cities with the highest vehicle use (Hong Kong, Seoul, Singapore, Taipei, and Tokyo) also have lower parking requirements than middle-income cities (Bangkok, Jakarta, Kuala Lumpur, and Manila). The table also shows that in business districts in cities like Sydney, it is increasingly common to have almost no parking requirements.

Table 4 shows the parking requirements for residential buildings. Compared to the data in Table 2, it is noticeable that some cities have very different approaches and requirements for residential uses, linked more to car ownership than car use.

Table 3.
 Parking requirements for office and commercial buildings in Asia (per 100m²
 gross area).
 Source: Barter 2011.

	CENTRAL BUSINESS DISTRICT (CBD) OFFICE BUILDINGS	OFFICE BUILDING OUTSIDE THE CBD	SHOPPING CENTER OUTSIDE THE CBD	AVERAGE COMMERCIAL REQUIREMENTS
Tokyo	0,3	0,3	0,4	0,36
Singapore	0,2	0,5	0,5	0,42
Hong Kong	0,4	0,6	0,6	0,57
Taipei	0,7	0,7	0,7	0,67
Seoul	0,1	1,0	1,0	0,78
Manila	1,3	1,4	1,0	1,19
Jakarta	1,0	1,0	1,7	1,33
Bangkok	1,7	1,7	2,6	2,15
Kuala Lumpur	1,5	2,6	2,7	2,40
Beijing	0,5	0,5	0,3	0,35
Dhaka	0,5	0,5	0,5	0,50
Guangzhou	0,6	0,6	0,6	0,60
Ahmedabad	0,7	0,7	0,7	0,65
Hanoi	1,0	1,0	1,0	1,00
Sydney	0	3,3	4,0	2,83

Table 4.
Requirements for residential buildings in Asia (spaces per 100 m²).
Source: Barter 2011.

URBAN AREA	SMALL APARTMENTS	MEDIUM-SIZED APARTMENTS	AVERAGE REQUIREMENTS FOR SMALL- AND MEDIUM-SIZED APARTMENTS
Jakarta	0,0	N/A	N/A
Tokyo	0,3	0,2	0,28
Hong Kong	0,2	0,6	0,42
Taipei	0,7	0,7	0,67
Manila	0,4	0,9	0,67
Bangkok	0,7	0,9	0,78
Singapore	1,7	0,9	1,30
Kuala Lumpur	1,7	1,0	1,35
Seoul	1,3	1,5	1,44
Ahmedabad	0,2	0,3	0,24
Dhaka	0,2	0,5	0,33
Hanoi	0,3	0,2	0,25
Beijing	0,7	0,4	0,52
Guangzhou	0,8	0,6	0,74
Sidney	1,6	1,2	1,36

PAID ON-STREET PARKING

UNITED STATES: SAN FRANCISCO

The SFpark program in San Francisco is perhaps the most successful, progressive, and recent parking policy improvement program. According to the SFpark website, “SFpark is pioneering the world’s most advanced parking management system. Using sensors, new meters, and demand-responsive pricing, SFpark takes the guesswork out of parking in the City. These elements work together to make parking easier to find and more convenient. This benefits drivers, bicyclists, pedestrians, visitors, residents, merchants, and more.”⁴

The purpose of the system is to:

- Create a demand management-responsive pricing structure for on-street parking.
- Set parking rates according to area-specific parking demand.
- Re-purpose “extra” parking spaces (i.e., part of the excess demand) for “parklets,” as part of efforts to reclaim public spaces.
- Implement an IT platform for registering, paying, and tracking the project (including through smartphones and other means).

UNITED STATES: CHICAGO

Chicago has implemented one of the most ambitious and far-reaching on-street parking management measures. In 2009, it granted a 75-year concession to Morgan Stanley for commercially operating the city’s 34,500 metered on-street parking spaces, in exchange for a onetime initial payment of \$1.157 billion. The rate system is classified into only three different zones: the Central Business District (CBD) or the Chicago Loop, outside the CBD, and the neighborhoods. The agreement includes an annual increase in the per-hour parking rate over four years (2009-2013). The rate in the CBD zone will more than double its initial rate (from US\$3 to US\$6.50); outside the CBD, the rate will quadruple (from US\$1 to US\$4); and the rate in the neighborhood zone will increase eightfold (from US\$0.25 to US\$2). Through this measure, by 2013 Chicago will have the highest on-street parking rates in the US.

⁴ <http://sfpark.org/how-it-works/>

NETHERLANDS: AMSTERDAM

Amsterdam has a multi-faceted parking management strategy that integrates many different elements, such as zone-specific rates, residential permits, park-and-ride (dissuasive parking), payment and monitoring technologies, off-street parking regulations, etc.

- **Zone-specific rates:** There are three types of zones: blue zones, 10-cent zones, and pay-and-display (P&D) zones. The blue zones are free and are used for short-term parking. The 10-cent zones are also used for short-term parking (max. one hour). This small fee is charged for servicing. The “re-occupation” of spaces has only been able to be controlled for users paying with a smartphone. The hourly rates for the pay-and-display metered zones vary between €0.90 and €5.00 (US\$1.10 and US\$6.40), and the rates go up the closer the space is to the city center.
- **Residential permits:** The parking cap management for central residential zones gives residents the option of buying a parking space (with a price tag of around €10,000, or US\$52,000) or waiting for someone to give up, sell, or exchange (for an annual public transportation pass) his residential parking permit.
- **Park-and-ride (dissuasive parking):** These are parking spaces on the outskirts of the city that are paid spaces (€7, or US\$7.70) and include a 24-hour public transit pass for up to five people. The goal is to allow visitors and suburban residents to comfortably enter the city, but via public transit.
- **Payment and monitoring technology:** One of the main elements lending so much success to parking management in Amsterdam is the implementation of payment and monitoring technologies for enforcement. Pay-by-mobile-phone service was introduced in 2006. Private companies manage the system and charge the city a service fee of 4% to 5% of revenue for the service. Parking meters are gradually being replaced by license plate recognition technology.
- **Off-street parking regulations:** The policy for including parking for real estate developments (known as the ABC system) uses public transit accessibility for the zone to determine the minimum parking requirement per square meter. The system is divided into three zones:
 A zones: excellent access to public transit – one space/250m²;
 B zones: good access to public transit and also good accessibility by car– one space/125m²; and
 C zones: little to no access to public transit – located mainly in the suburbs.

DENMARK: COPENHAGEN

Copenhagen has a comprehensive parking management strategy that includes the majority of the elements described above for Amsterdam. One of the policy objectives is to reduce congestion in the city center. Traffic in the city dropped 6% between 2005 and 2008, despite a 13% increase in motorization.

The city has 30,000 on-street parking spaces, which are divided into three zones, each with different colors and prices. Payment methods include by phone (18%), credit card (40%), and coins (42%). The management and collection of revenues is handled by two private companies that transfer 100% of the parking revenue to the city. Residents close to metered areas must acquire an annual permit costing €3 (US\$120) for the first vehicle and pay an additional amount for second and third vehicles.

On-street parking has been reduced in recent years to re-allocate this space to infrastructure for public and/or non-motorized transit (bicycle lanes). The distance required between curbside parking and street corners has been increased. Additionally, the city has begun experimenting with creating pedestrian-only zones (through the use of retractable bollards) and bus-only lanes.

UNITED KINGDOM: LONDON

The parking management strategy for London has evolved over the past few decades from being controlled by the police in the 1980s, when parking violations were criminal acts, to more flexible systems that do not depend solely on revenues generated through fines.

The controlled parking zones (CPZ) are areas with short-term parking (less than four hours). The rates are set by each borough. For example, the rates in the Westminster Borough vary between £1.10 and £4.40 (approximately between US\$1.60 and US\$6.60) per hour. The city advises boroughs to set the rates to achieve an 85% saturation level. On-street parking income is limited by statute and, therefore, the boroughs are restricted in how surplus income is used. The rates are set in three-minute increments (20 pence or US\$0.30), up to £4 (US\$6) per hour.

In recent years, pay-by-phone and credit card systems have been rolled out. Similar to the Copenhagen approach, London drivers pay a 10-pence transaction cost. The environmental advantage of pay-by-phone is that installing a sign on a post with a phone number and payment code leaves a smaller carbon footprint than installing and operating a parking meter. The main parking management feature that sets London apart from other European cities is the introduction of CO₂-based parking fees for residential parking permits. For example, in Islington, there are seven different emissions ratings linked to various fees – the top price is £200 (US\$302) per year (more than double the old fee of £95, or US\$143, per year).

Current situation in Latin America

This section describes the current state of general TDM policies throughout the region, with a focus on the causes of congestion. It will also address the challenges to the various parking policies in the 12 cities studied. Table 5 contains a summary of the measures found in the study.

OVERVIEW OF TRAVEL DEMAND MANAGEMENT IN LATIN AMERICA

It is important to identify why car use in the region has increased significantly in recent years. Based on the findings of several studies on the Latin American case (which will be presented later in the document), the following causes were identified:

- **High fuel subsidies:** Many countries in the region subsidize fuel, believing it will benefit lower-income households. However, according to an International Monetary Fund (IMF) study, “gasoline subsidies are the most regressive, with more than 80% of total benefits going to the richest 40% of households” (IMF 2013). In countries like Colombia there are fuel subsidies, but there is also a gasoline surcharge to provide cross-subsidies for mass transit projects.
- **Tariffs and other economic and financial incentives:** Several countries in the region provide incentives that increase motorization through discounts and tax breaks on vehicle imports. There are also economic treaties among countries in the region that reduce import tariffs, among other things, that ultimately translate into a lower end-price for the consumers.
- **Ample parking supply:** In Latin America, there are policies focused on creating ample parking supply. This sends a message to car owners that there is parking available for their vehicle, which, in turn, can lead to increased motorization. The parking supply issue will be addressed later in the document.
- **Construction of new and expanding existing roadways for vehicles:** Many countries in Latin America have opted to build large elevated highways and widen existing roadways, with the hope that this would reduce congestion in the city. However, experience shows that the opposite actually occurs. There may be short-term benefits from this type of infrastructure, but in the medium- and long-terms, it leads to increased travel demand and an increase in the number of vehicles. This effect is known as induced demand.

Table 5.
Summary of city-specific demand management measures.
Source: Prepared by the authors.

MEASURE IMPLEMENTED		Monterrey	Guadalajara	Mexico City	Medellin	Bogota	Belo Horizonte	Sao Paulo	Rio de Janeiro	Porto Alegre	Santiago	Rosario	Buenos Aires
	License plate restrictions			•	•	•		•			•		
	Congestion charges (proposals)					•		•			•		
	Car-free day				•	•							
On-street parking Metered	Metered parking	•	•	•						•		•	
	With a ticket											•	•
	Manual / Rotary parking (pay-by-phone or credit card)		•		•		•	•	•	•	•	•	
Off-street parking	Concessions	•	•	•		•	•	•	•		•	•	•
	Private regulated		•		•	•							

TRAVEL DEMAND MANAGEMENT IN LATIN AMERICA

FACTORS THAT INFLUENCE EFFECTIVENESS OF TDM MEASURES

The growing number of vehicles in Latin America, stemming from regional growth in gross domestic product (GDP), is a factor that directly impacts traffic congestion in cities throughout the region. It also makes it necessary to establish effective short-term solutions.

The issue of sustainable transportation is well understood in the region (but only in general terms). There have been significant advances in the planning and implementation of public transit systems and, to a certain degree, non-motorized transportation. However, most municipal administrations lack knowledge and have insufficient technical understanding. Efforts to reduce congestion have not included TDM or this approach has been implemented ineffectively, resulting in the opposite of the desired effect. In addition to halting projects that could enhance transportation conditions in Latin American cities, this situation negatively impacts the viability of new proposals, and, indeed, changing or revamping other truly effective policies and instruments. Consequently, congestion remains problematic in the region; however, this situation could be motivation for effective implementation of these TDM mechanisms.

The case studies carried out in 12 cities in the region identified obstacles to TDM and the related policies that have been implemented in Latin America with varying degrees of success.

The following obstacles were identified:

INCREASED MOTORIZATION

This phenomenon was observed in all of the cities studied. This refers to the increase in vehicle purchases, and specifically defines the quantity of registered vehicles per 1,000 inhabitants. Motorization is tied to congestion, kilometers traveled, air pollution, and, in general, all of the negative externalities associated with vehicle use. Given that there are few TDM measures in the region, this motorization phenomenon has not been effectively reined in, and, in some cases, the implementation of some policy instruments has actually increased motorization.

Chart 1 shows motorization indicators for the cities in the study. It also shows the strong growth trend in this phenomenon.

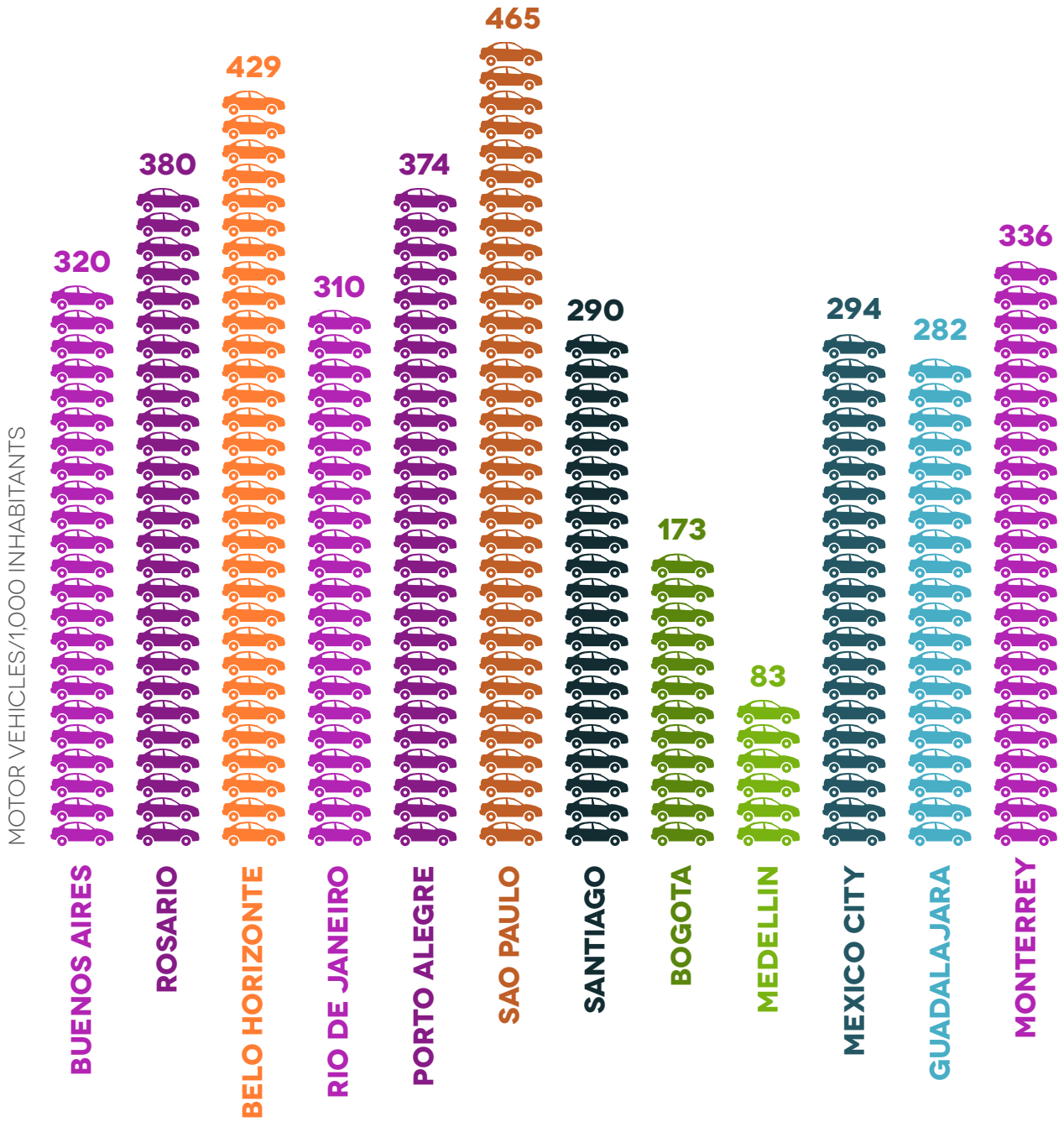


Chart 1.
Motorization in the cities studied (2011). Includes all motorized vehicles.
Source: Prepared by the authors, based on several sources.

SCARCE KNOWLEDGE ON TRAVEL DEMAND MANAGEMENT INSTRUMENTS

A major challenge to implementing TDM in the region is the scarcity or lack of knowledge, or that the TDM measures are incorrectly implemented (under assumptions or counterproductive measures). Many of the cases show that governmental agencies or transportation experts understood the general concept of TDM and the rationale behind this approach, but they did not fully understand the specifics of how TDM should be implemented. In some cases, even though it was clear to the actors what needed to be improved, they suggested measures that had the opposite effect (e.g., expanding the parking supply).

IMPLEMENTING CONTRADICTIONARY MEASURES

A key common thread in the cities studied was that despite officials being convinced of the need to improve traffic conditions and to use sustainable transportation as a primary and priority policy measure, among other related approaches, they implemented measures counter to the nature of congestion reduction, roadway efficiency, equality, access, and other sustainable transportation principles. A clear example is the construction of two-tiered highways (super-highway in Mexico City), while also implementing progressive parking policies (EcoParq). What stands out in the analysis is that transportation policies in the cities studied are not particularly consistent, which prevents positive real impacts; a situation not limited to Latin America.

LOW INTEREST RATES FOR LOANS ON VEHICLE PURCHASES

Although it was not possible to compile comprehensive data for all the cities, there was an evident trend in the prevalence of payment facilities for purchasing vehicles. In Bogota, for example, banking entities in the country have created car-financing strategies that increase purchasing possibilities and delay car owner debt obligations for several months.

ASSYMETRICAL FINANCING

Although this report does not go into detail on this issue, the financial structure of fund distribution in the transportation sector does not include, for example, real costs for vehicle use or a complete analysis of the social and environmental impact of negative externalities. This asymmetrical financing condition creates a situation in which, though there are no explicit financing policies favoring certain modes of transportation over others, there is an imbalance in the way prices are assigned to services: for example, public transit fares (which, in many cases, are not subsidized) vs. the free use of most roadways by all modes of transportation. In any case, no city in the world has attained the ideal situation in which vehicle-use related costs are covered by drivers, or an equal redistribution of resources based on the externalities induced by each mode (Zegras 2006).

PRICE STRUCTURE AND FUEL SUBSIDIES

Oil prices have fluctuated drastically in recent years, leading to uneasiness in oil-dependent markets and, as a result, concern over maintaining the price equilibrium in several countries. Chart 2 shows the changes in the price of a barrel of oil over the last 30 years.

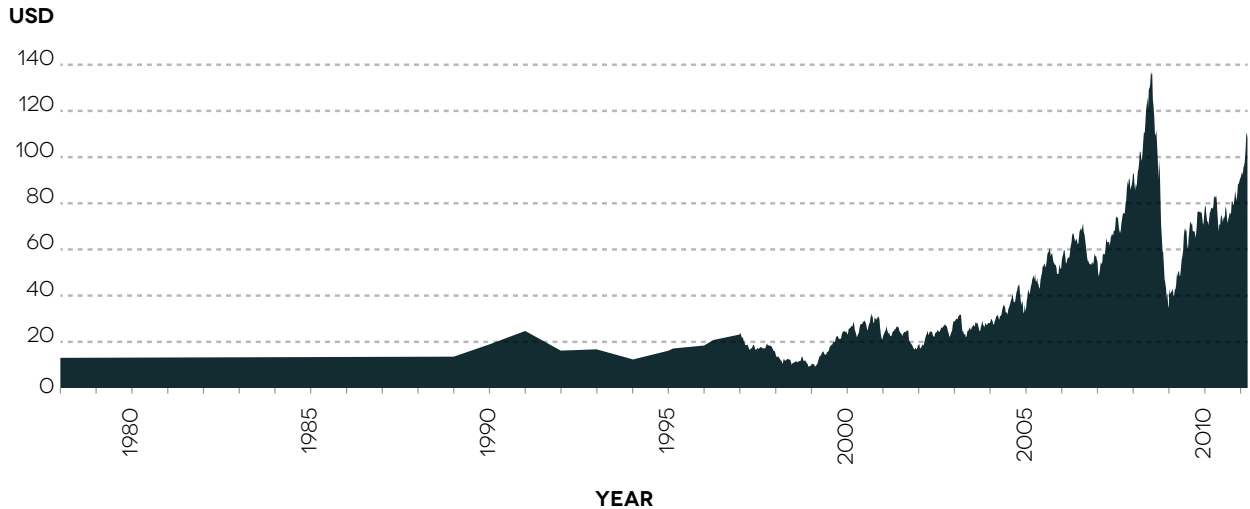


Chart 2.
 Change in the price of a barrel of oil in USD.
 Source: Energy Information Administration 2011

Fuel prices in countries throughout the region are determined by several factors, but particularly by fuel subsidies (specifically gasoline), in all cases except Brazil (which has a gasoline tax, but not a diesel tax). Often, these subsidies are maintained through political pressure or the government’s strong conviction that subsidies are necessary for various reasons, including enhancing conditions of the middle class and reducing the cost of basic necessities. The debate over this political setting for fuel subsidies is extensive and well documented (e.g., in GIZ 2011). Table 6 shows gasoline subsidies and additional charges in some Latin American countries.

However, it must be noted that, fuel also has assigned taxes in the countries that were studied. Table 7 shows the varying prices of gasoline (USD/Liter) with octane rating of 95.

In addition, the pursuit to find information regarding the configuration of the final price of gasoline, is not the same for the countries in the study, in many cases it is complex and imprecise. Table 8 demonstrates the availability of the composition and mechanisms of control of gasoline prices according to a study from the German Agency International Cooperation (GIZ, 2013).

COUNTRY	SUBSIDY IN \$ MILLION (YEAR)	SUBSIDY AS % OF GDP
Argentina	7.892 (2008)	2,3%
Colombia	4.896 (2008)	2,4%
México	17.260 (2008)	1,5%
Chile ⁵	75 (2011)	0,03%
Brasil	0 (2011) ⁶	0%
Bolivia	450 (2008)	2,4%
Ecuador	2.923 (2008)	5,3%

Table 6.

Fuel subsidies (gasoline) in countries studied.

Sources: Campodónico 2009; Minminas Colombia 2011; Chileenergía; authors' research.

COUNTRY (year)	PRICE WITHOUT TAX (USD / L)	TAX**	TAX AS % OF FINAL PRICE	CONSUMER PRICE
Argentina (2012)	1,06	0,40	38%	1,45
Colombia (2012)	0,79	0,38	48%	1,17
México (2010)	0,69	0,12	17%	0,81
Chile (2012)	0,95	0,70	74%	1,65
Brasil (2010)	0,87	0,71	82%	1,58

Table 7.

Price in USD/liter of gasoline with octane rating of 95*

Sources: www.energypedia.info/wiki/International_Fuel_Prices, www.se.gob.ar/basemercosur/reportes_fecha.php, www.bcn.cl/carpeta_temas_profundidad/sipco-sepco-fepp-feppo

* For Argentina and Chile the analysis includes gasoline with a octane ratings higher than 95

** includes sales tax

⁵ See <http://www.chileenergía.cl/rebaja-del-impuesto-especifico-a-los-combustibles>.

⁶ No official value reported, however, there is a general understanding of a "price adjustment" – See <http://g1.globo.com/natureza/noticia/2012/01/brasil-deve-cortar-subsidio-da-gasolina-diz-pesquisador-da-usp.html>.

	READILY AVAILABLE	PARTIALLY AVAILABLE, UNCLEAR INFORMATION, DIFFICULT TO ACCESS	INFORMATION NOT AVAILABLE
COLOMBIA	⚙️ \$		
BRASIL		⚙️ \$	
MÉXICO		\$	⚙️
CHILE		⚙️ \$	
ARGENTINA		⚙️	\$

⚙️	PRICE COMPOSITION INFORMATION	\$	PRICE CONTROL MECHANISM INFORMATION
----	----------------------------------	----	--

Table 8.
 Fuel price availability in countries in the study.
 Source: https://energypedia.info/wiki/International_Fuel_Prices
 Prepared by the authors.

REDUCED TARIFFS AND TAXES ON AUTOMOBILES

There have been several bi-national free trade agreements (FTAs), whose aim is to open up and spur markets between the two signatory countries. However, regarding transportation and motorization, these measures have generally had negative consequences for transportation sustainability. These agreements cause imported automobile prices to fall, which, in turn, lower the price of other vehicles. In some cases where the negative effects are clear, there are contradictory versions of the policies in the Ministries of Economy, Treasury or Finance, and Transportation, such as in Colombia, Mexico, and Brazil.

GOVERNMENT CONTROL: POLITICAL VS. TECHNICAL

Although this control is necessary and desired as part of the essence of governance, in some cases this condition has posed a challenge to implementing TDM policies or improving parking policies.

Chart 3 shows the incidence of parking-related laws, decrees, and other regulations found in each city. In this case, Bogota is the most regulation-heavy city, followed by Medellin. Mexico and Chile have the fewest related regulations in their cities (although Santiago has specific regulations for each district that were not included in this case). This could be an indicator of the red tape tied to this issue. This chart indicates that one of the issues in the cities studied was the difficulty in defining a clearer parking policy when too many

institutions and regulations were involved and there was no “framework” city parking policy. The number and type of regulations proves this challenge to a certain degree.

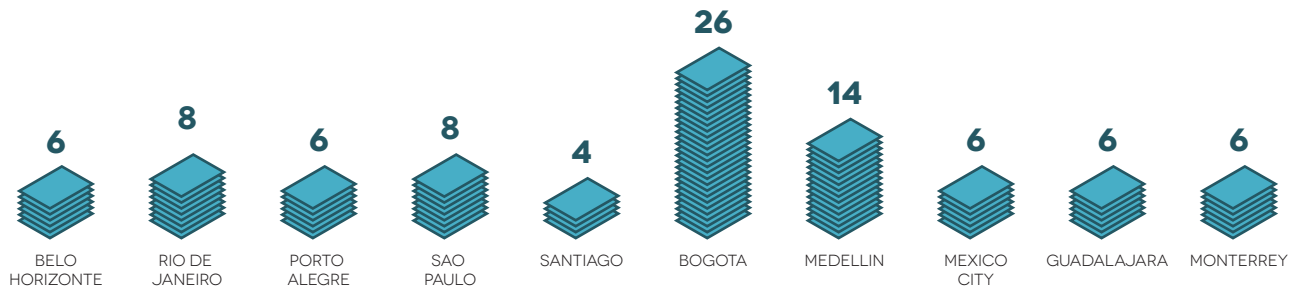


Chart 3.
Range and incidence of parking-related regulations in each city studied.
Source: Prepared by the authors.

STATE OF TDM PRACTICE IN THE REGION

The existing TDM measures in the 12 cities are insufficient. In many cases, these measures have not really been effective or have had a marginal impact. In other cases, actions have been taken for purposes other than TDM, but end up being designed as such. In general, the region has many measures that are contrary to TDM, such as expanding the parking supply (generally through the creation of lots), reducing automobile purchase- or use-related prices (as described above), and reducing on-street parking, all this with the intention of boosting roadway capacity and, in theory, improving vehicle flow (as in Santiago).

Unlike public transit improvement measures or promoting bicycle use or walking, it is more complicated to persuade people and decision-makers to buy into TDM measures. This explains, in part, the low levels of implementation. The three TDM policies that have been implemented in some Latin American cities are described below.

LICENSE PLATE RESTRICTIONS

License plate restrictions have been one of the more popular policies in the region, despite the fact that shortly after the first implementation in 1986 in Santiago, it became clear that this measure had several adverse effects. License plate restriction has been implemented in Santiago, Mexico City, Bogota, Medellin, and Sao Paulo, in addition to other cities outside the scope of this study (nine in Colombia, Quito, and La Paz, among others). Figure 12 shows the historical and geographic evolution of this measure in the region.

This measure has been used for two specific reasons: to reduce air pollution (the reason why it was initially implemented in Santiago and Mexico City) and to reduce traffic congestion (a secondary reason for Santiago and Mexico City, and a primary reason for Sao Paulo, Bogota, and Medellin).

These license-based measures have taken on various forms, from restrictions based on whether the license plate number ended in an odd or even number, or by groups of numbers. Very complex reformulation schemes have come about to counter the many driver strategies to bypass the system.

A few studies (including Gallego, Montero et al. 2011) have documented the negative effects of the license plate restriction approach, as observed in several cities where these restrictions have been put in place. They are the following:

- Purchase of a second (or third) vehicle (automobile or motorcycle), generally of lesser value and occasionally less fuel efficient resulting in higher greenhouse gas emissions and increased air pollution compared to the primary vehicle.
- Distortion of the bi-modal travel behavior curve from one rush hour in the morning and another in the afternoon to one long rush hour during the day (or two longer rush hours).
- Increased car use on Saturdays due to greater availability of vehicles and avoidance of the Monday-Friday restrictions.

The various measures have had different levels of effectiveness. The conclusion is that this type of measure should be accompanied by others (e.g., not lowering tariffs) to be an effective, long-term measure. If this method is not implemented properly, as has been the case in various cities, the result can be increased motorization.

CONGESTION CHARGE (PROPOSALS)

Congestion charges have been successfully implemented in several cities around the world, most notably in Singapore, London, and Stockholm (see the “pay-per-use” [urban toll] section). This instrument has had positive effects in the short-, medium-, and long-terms, and has generated significant revenue for these cities (after deducting operating costs). As such, the congestion charge approach is being proposed in many places as a TDM option. However, acceptance of the policy is generally difficult to obtain, and capital costs are considerable. These two obstacles make implementation of this type of scheme unlikely in Latin America in the short term. However, there are three processes for creating schemes of this type in the cities studied: Sao Paulo, Santiago (Steer Davies and Gleave 2009), and Bogota. See Figures 10 and 11 for the congestion charge proposals in Bogota and Santiago.

CAR-FREE DAY

Given that TDM policies entail restricting car use, the car-free day measure has been implemented in various cities throughout the region. However, only two cities have supported the tool with legislation.

The car-free day was proposed by Eric Britton in 1994 (Britton 1994) as an opportunity to reflect on the need for personal vehicles and as an experiment “to see what happens” when people leave their cars at home.

A World Car-Free Day was organized in 1999, which was a pilot campaign as part of the European Union’s “In town, without my car” initiative. This campaign continued as the European Mobility Week. Then, in 2000, civil society organizations pushed for turning September 22 into a World Car-Free Day in Europe and around the globe. This initiative seeks to offer cities a day free of noise, stress, and pollution. The event is also intended to raise awareness among urban planners and politicians to promote prioritizing alternative modes of transportation, such as walking, biking, or using public transit instead of personal cars.⁷

In 2001, Bogota was the first city in Latin America to fully implement this measure (citywide). The event later spread to other cities at the global scale. Case Study 3 looks at Bogota and Medellin.

Case Study 3: Car-free days in Bogota and Medellin

Bogota pioneered this initiative in Latin America. Following the first Car-Free Day in 2000 there was a referendum on whether to permanently implement the measure starting in 2001. The result was 63% in favor. A related referendum on whether to restrict vehicles starting in 2015 won with 51% of the vote. The first vote became District Decree 1098 of 2000, which prohibited the movement of motor vehicles in the city of Bogota the first Thursday of February every year. The measure has been executed every year since then, and the only vehicles circulating that day are public transit and taxis.

In Medellin, the car-free day is mandatory and was institutionalized through Municipal Agreement 021 of 2008 of the Medellin Council. Every year, the city celebrates Earth Day, April 22, as a car-free day with these goals in mind: lowering environmental pollution levels from noise and gases emitted by motor vehicles, reducing

the number of roadway crashes in the city, enhancing space for public transport access, raising awareness among citizens on the problems associated with low public transit use, promoting alternatives to single-occupant vehicular travel that would be less damaging to the environment, and creating a social pedagogy. This pedagogy addresses environmental protection, the efficient use of natural resources, road safety, and health as fundamental obligations that are part of citizen-shared responsibility. Non-compliance is sanctioned with a fine equal to 15 days of current daily wages.

The car-free measure was implemented the last two years (2011 and 2012) between 7 a.m. and 6 p.m. There are a few exceptions, for example vehicles carrying at least three people are permitted to circulate. The license plate restriction measure is regulated as usual on the car-free day.

⁷ <http://www.worldcarfree.net/wcfd/faq.php>

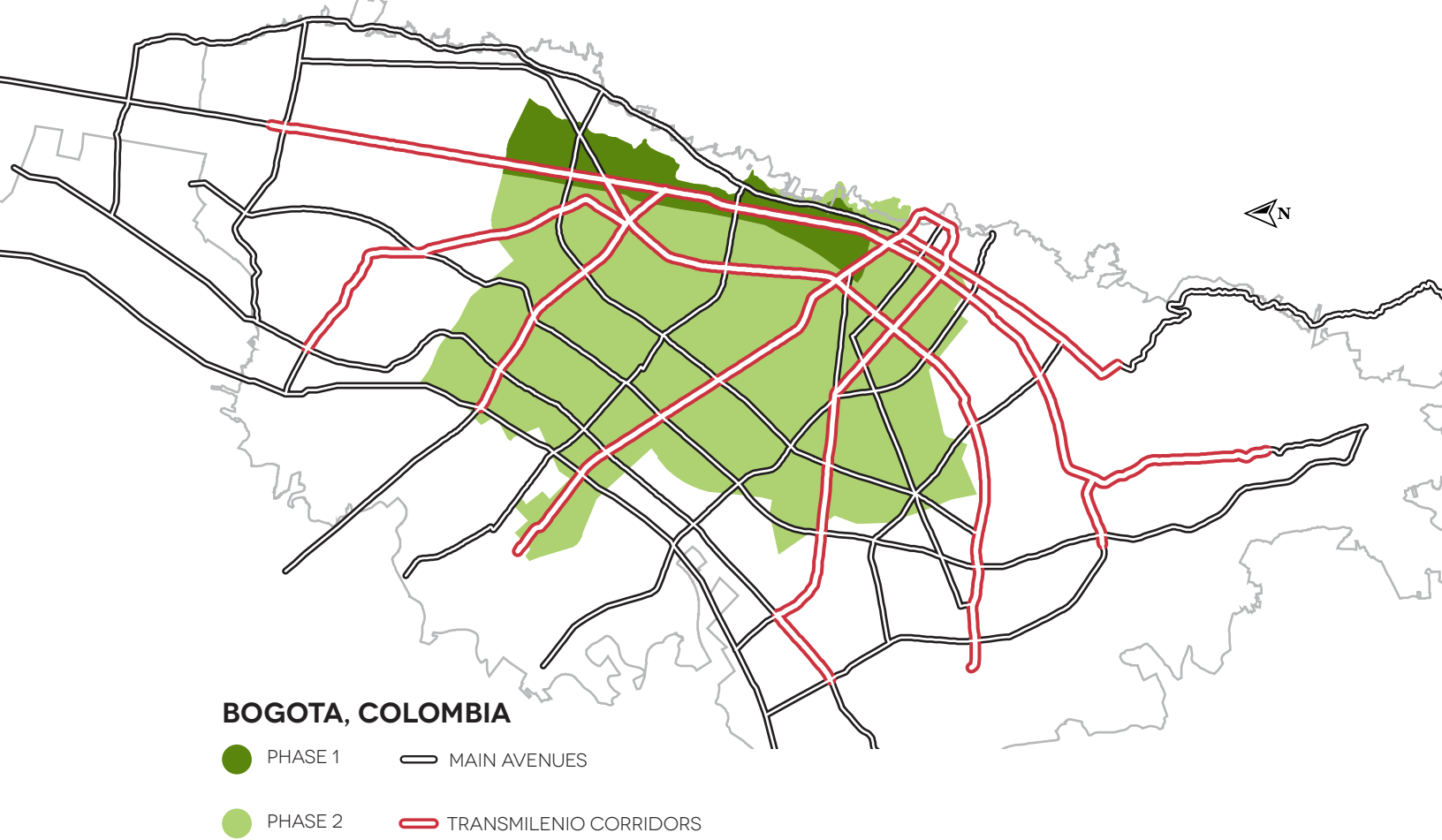


Figure 10.
 Bogotá: Congestion charge proposal made by the Bogotá 21 project.
 Source: Wessels, Pardo et al. 2012.

Figure 11.
 Santiago: Congestion charge proposal.
 Source: Steer Davies and Gleave 2009.

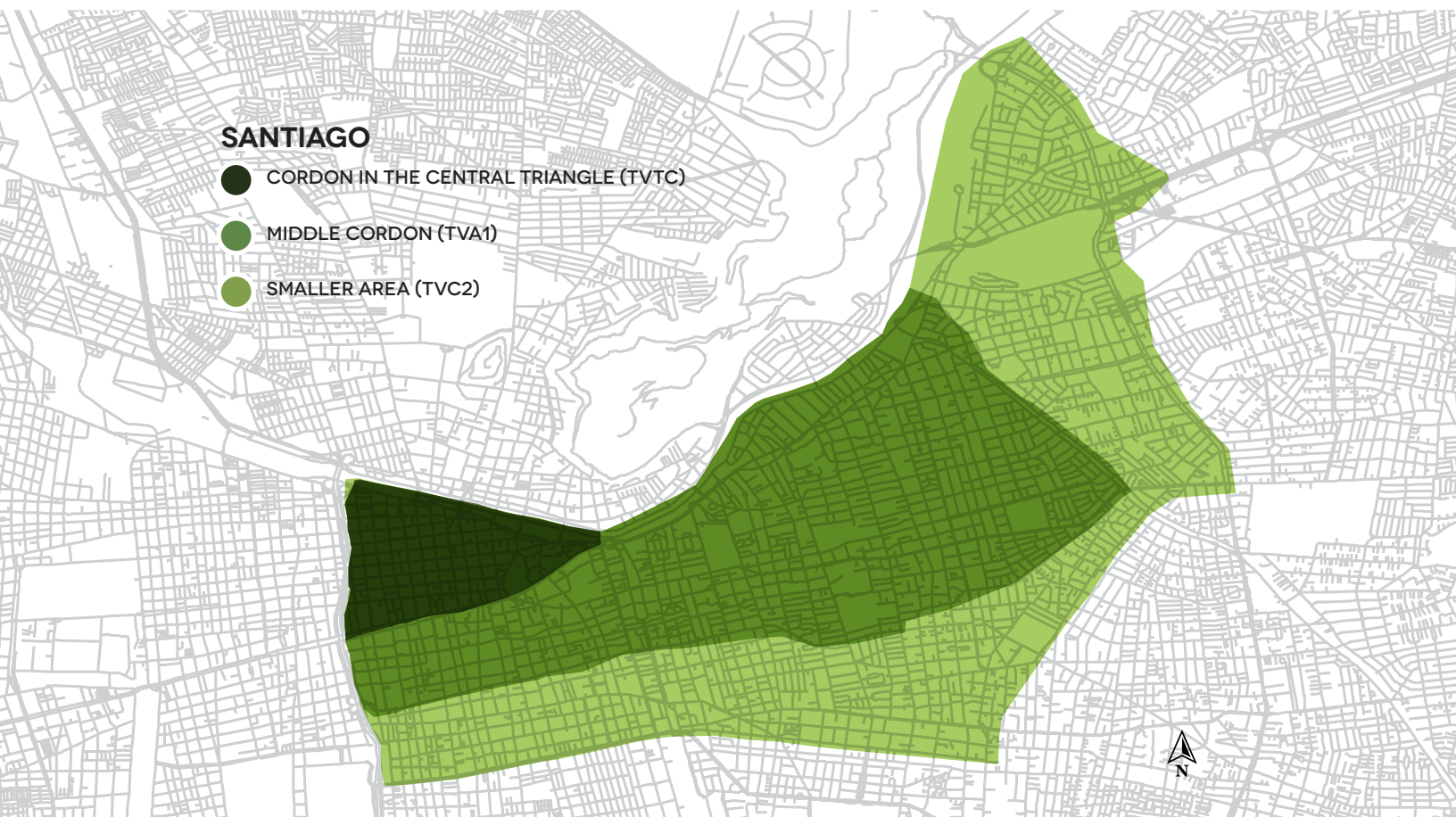




Figure 12.
Historical and geographic map of license plate restriction programs,
implemented for two primary reasons.
Source: Prepared by the authors.

SUMMARY OF MEASURES IN THE 12 CITIES STUDIED

MEASURE	SITUATION	RECOMMENDATION
License plate restriction	Some cities have implemented license plate restrictions but the measure has been found to have effects contrary to the desired outcome and, most importantly, it has a negative impact in the medium- and long-terms.	Independent studies must be performed to analyze the effectiveness of this measure, and to develop recommendations on its effectiveness at reducing congestion in the long term.
Congestion charges	Some cities have plans to implement congestion charge projects (Sao Paulo and Bogota), but the key actors and political pressure surrounding this type of measure make implementation challenging.	Institutional and regulatory solutions must be developed to effectively implement this measure.
Car-free day	This has been implemented in several Latin American cities, but only two (Bogota and Medellin) have related legislation.	TDM entails vehicle-use restrictions. The car-free day measure is designed as a specific TDM tool that could be included.
On-street parking	Some cities have made significant progress (Mexico City, Medellin, and Rosario) that could be used as models. There are some interesting projects in the pipeline (Bogota and Buenos Aires) seeking to enhance on-street parking market conditions. There are only a few cities that have free on-street parking (Bogota and Guadalajara).	Although there is no real “best practices” model in the 12 cities studied, there are some successful examples. As such, on-street parking is an area in which there is greater probability of medium-term improvements in all the cities, as well as ability to replicate in others.
Informal parking	In almost all of the cities studied, there were people charging for informal on-street parking, even when there are clear on-street parking policies. Drivers accept parking fees, but there is a lost opportunity for the local government to create a clear policy, generate revenue, and prevent “mafias” from fighting “penny wars” over parking in public spaces.	On-street parking is an opportunity for implementing fee and organizational policies, and maximizing space and resources. It is one of the frequently recommended tools for having a significant impact on travel demand with little to no implementation costs. Moreover, there is greater probability of it being accepted over other similar measures.
Off-street parking	There were no noteworthy examples of good off-street parking practices. Clearly, cities still look to increase the number of parking spaces, and do so “to fix the problem.”	It is essential to find ways to incentivize more effective policies in the area of off-street parking in such a way that complements on-street parking.

Table 9.
TDM measures, current situation, and recommendations.
Source: Prepared by the authors.

CHALLENGES IN PARKING POLICIES

Parking policies are one of the frequently recommended tools that have a significant impact on travel demand with little to no implementation costs. Moreover, there is greater probability of this approach being accepted over other similar measures. However, this type of measure has not been very effective as a TDM instrument in Latin America (with some exceptions) because this approach has expanded parking supply, used public resources for implementation (design, construction, and operations), and tried to set fixed prices. However, in general, on- and off-street parking have been undermined by rather passive policies in terms of regulation, enforcement, and use as a congestion reduction measure. This approach to parking policy has mostly been perceived as something intended to provide specific solutions, but that is not part of a comprehensive policy.

The challenges to effective implementation of parking policies identified in Latin America are described below.

PARKING EXCESS SUPPLY

Several of the cities studied made the mistake of proposing increased parking supply, specifically in these cases:

- Belo Horizonte prepared a request for bids in 2012 for construction of new underground short-term parking with 3,985 spaces in the city center. The government would fund this (another common error)⁸.
- Porto Alegre is promoting the building of underground parking near the city center. In 2012, the city issued a request for expression of interest for construction and operation.
- Bogota's Master Mobility Plan includes the following strategy: take advantage of urban renovation and revitalization efforts to provide more underground and above-ground parking.
- Rosario's Comprehensive Mobility Plan (PIM) defined the following action: According to this criterion, motorcycle parking must be promoted and underground parking prioritized over ground-level parking, thereby increasing the number of spaces.

These examples are specific cases in which there is a clear need for TDM policy, but interviews in several cities demonstrated this same problem in developing parking policies.

⁸ Based on the analysis of the first few chapters of this report, and assuming that demand management requires reducing the need for more infrastructure construction to satisfy demand, the fact that the government covers parking costs is characterized here as a mistake.

SUBSIDIES FOR PARKING OPERATIONS

A common problem seen in several transportation projects is establishing a “demand guarantee” for the operator of a specific service for which a concession has been granted by the government. This consists of an initial project study (in this case, parking) that determines the expected demand for the service to be provided (e.g., 100 vehicles will park in the lot during the day). The concessionaire is granted a contract specifying that if the expected demand is not reached (e.g., only 60 cars per day), an operator may charge the government a “guarantee” for this gap in demand. In this example, the government would have to pay the operator the value of the revenue that would have come from the 40 vehicles.

TRANSITION FROM ON-STREET TO OFF-STREET

Another example of mistakes made in parking policies in the region that become an obstacle to TDM is the development of policies aiming to eliminate on-street parking (in theory, a well-intentioned measure). These policies, through transferring spaces to off-street lots without actually limiting the parking supply, create demand and saturate roadways. This phenomenon, which is constantly seen around the globe, was also present in cities throughout the region. In reality, this approach is only a superficial fix.

Figure 13.
Example of formal off-street parking where previous on-street parking spaces have been replaced by a sidewalk.



In Rosario, the Comprehensive Mobility Plan (PIM), approved by citizens through referendum, outlined how the city would build underground parking to reduce traffic congestion. However, following the advice of international organizations, it was redesigned to be a parking policy more in line with TDM.

The mayor's office in Bogota emphasized this policy in 1998-2000, and promoted the creation of off-street parking (even offering discounts to those who built multi-level infrastructures) to counter the "lack of on-street parking."

Sao Paulo's parking policy also discouraged on-street parking but simultaneously promoted the construction of public off-street parking to be operated by private companies. Furthermore, in July 2012, the Municipal Transport Secretariat (SMT) announced a referendum on the concession for the implementation, maintenance, and operation of three public parking areas in the city center.

Overall, these types of concessions are granted because many think that the private sector should manage parking – since vehicles are private property, parking should also be private. TDM, however, should always be integrated, since off-street parking uses roadway infrastructure (and public space in general) that has to be managed by the government.

FIXED PARKING PRICES

Some cities have a policy of crafting specific legislation to define the maximum parking rate, which is occasionally differentiated by zones and lot characteristics. This policy poses further challenges to achieving comprehensive TDM parking policies in the region, and clearly reduces market effectiveness on setting rates.

Chart 4 shows a price comparison for a public transit ticket and the value of an hour of street parking. This chart demonstrates how the cost of taking public transportation in some cities is much higher than parking, which is a disincentive to using public transit and encourages vehicle use. This finding replicates the 2011 GIZ comparison of several European cities (GIZ 2011). Bogota was not included in the Chart 4 comparison because no numbers are available, since street parking is not formally charged (it is charged informally, however).

In 2012, the average per-hour rate for public parking in central Medellin was \$2,800 pesos (US\$1.54) for vehicles and \$800 pesos (US\$0.44) for motorcycles. The first hour is charged in full, independent of the time the vehicle is parked. Fieldwork has shown that after the first hour, parking is charged in 15- or 30-minute increments. For this area of the city, the parking supply exclusively for motorcycles is 68% higher than for automobiles, bearing in mind that automobile parking facilities also include motorcycle spaces.⁹

⁹ Based on fieldwork.

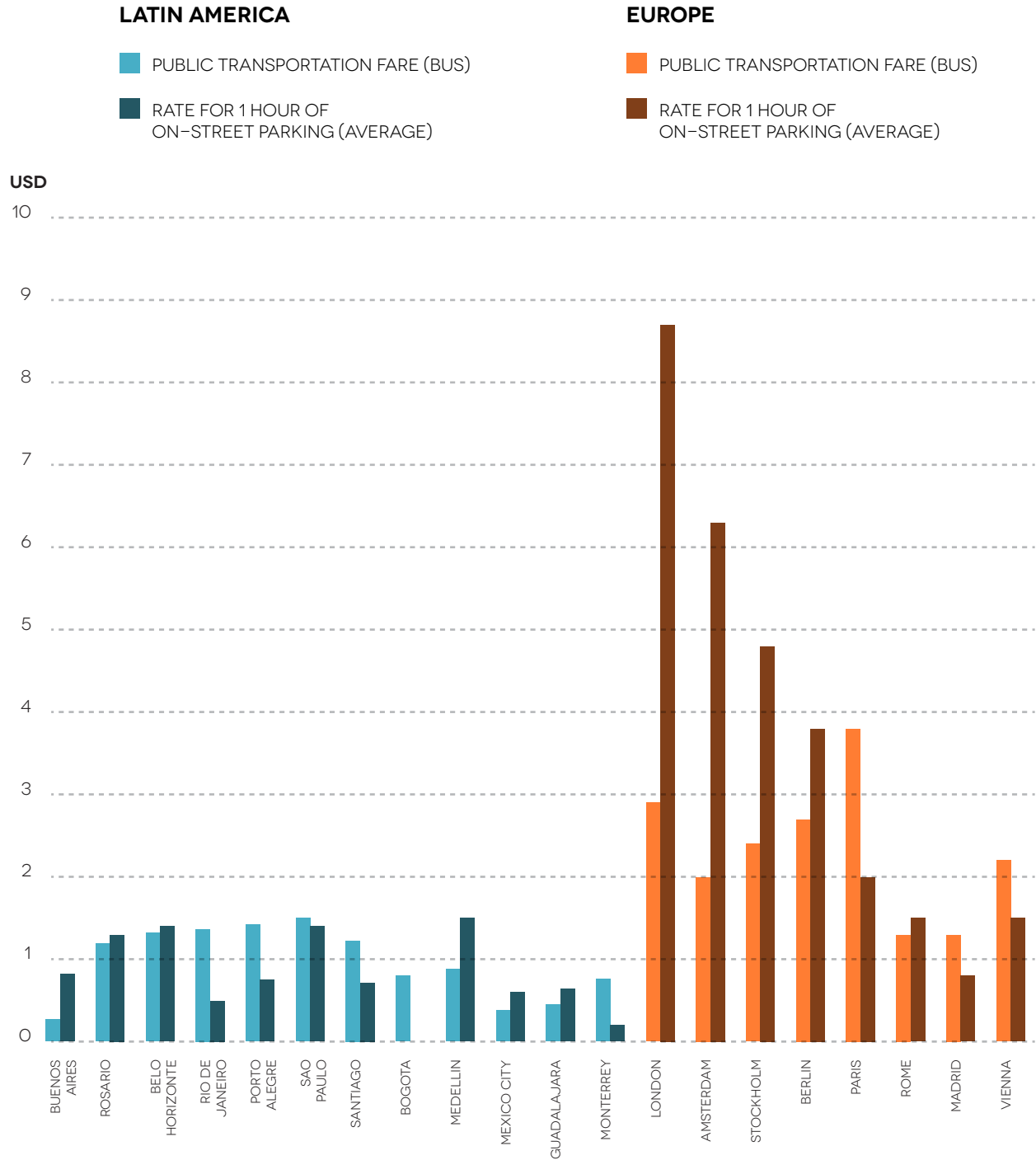


Chart 4. Parking value vs. public transport fare in the cities studied and several European cities.
Sources: GIZ data (2011), and prepared by the authors.

The development of this TDM measure in Bogota is as follows:

- **Since 1977 (Decree 1121 of 1977):** Parking as a business is a private economic activity regulated by law that establishes an official maximum rate scheme, per hour or fraction thereof, for covered, semi-covered, and open-air parking structures.
- **Decree 423 of 1995:** The administration established the controlled price scheme, with a registry of rates per hour and fraction thereof, for the local mayor's office, which manages rate control.
- **2004:** Return to the policy establishing a maximum per hour or fraction thereof policy due to political pressure from city council members over the high rates being charged.
- **Agreement 356 of 2008:** Establishes a maximum per-minute rate, based on city zone.

AD HOC PRICE SETTING FOR INFORMAL PARKING

The price for informal parking in Mexican cities ranges between MXN\$10 and MXN\$50 (US\$0.70–US\$3.80), depending on the zone, time of day, and whether or not there are any special events. In Guadalajara, business days cost between MXN\$20 and MXN\$30 (US\$1.50–US\$2.30). In Bogota, per-day rates in zones close to the business district may reach COP\$5,000 (US\$2.70). In Buenos Aires, informal parking can cost between US\$0.40 and US\$1 for day-time parking and US\$1 to US\$2.12 for night-time parking. A more detailed report of informal parking costs would be useful to reveal the specific values of these costs. This analysis would require a considerable survey to have generalizable values for each city.

MINIMUM PARKING REQUIREMENTS

All of the cities studied in the region have parking requirements. However, it is interesting to observe that this is included as an essential element of urban planning, while other more essential elements, such as service and density of public transit networks, do not need to be included. With the exception of very specific cases for certain zones in some of the cities, the cities studied – as a rule – defined minimum parking standards for the various land uses. As has been widely established in other studies (Shoup 2005; Barter 2011), this practice is completely contrary to the desired outcome and counterproductive for the intended goals. The practice follows the widespread notion that there is an inherent need for parking spaces in every place.

There are, nonetheless, indications that this trend is changing in specific areas. For example, Belo Horizonte has proposed separating parking from housing units. Porto Alegre's central district has no mandatory parking requirements for properties on certain roadways, although this is part of a 1999 law to preserve historic heritage.

In Rio de Janeiro, the Porto Maravilha Urban Operation contains special legislation to set requirements lower than those normally required (in this case, one parking space per 50m² for commercial buildings; in other zones, one per 40m²). This regulation is more the exception than the rule in this city.

Lastly, Bogota has proposed urban re-densification zones (particularly in the city center), where eliminating parking requirements was recommended (no minimums or maximums).

The next sections, categorized according to the types of parking in each city, will focus on the way parking policies have been crafted in the cities studied.

PARKING POLICIES IN THE REGION

Parking policies in the region have some common themes, and the measures that have been implemented are similar, except in isolated cases. There have been some very useful projects, for example, in Mexico City, and other less visible but equally important ones in Medellin, Rosario, Buenos Aires, and other cities.

However, the cities studied have generally implemented mostly ineffective measures for using parking as a TDM tool. These ineffective measures include expanding parking supply (sometimes even buying lots with public funds or building underground or multi-level parking structures) and fixing rates (or giving “controlled price liberalization”). In general, on- and off-street parking is undermined by a laissez-faire policy for regulation, enforcement, and use as a congestion reduction measure. The specific solutions developed for this issue do not fit into a more comprehensive policy.

Figure 14 shows graphically the various types of parking found in the cities studied, using the categories described in the “Types of Parking” section in this guidebook.

Below are the policies, projects, and programs in each city for on-street, informal, off-street, and land-use-specific parking, including characteristics and some relevant cases.

REGULATED ON-STREET PARKING: WITH METERS, TICKETS, AND MANUAL SYSTEMS

Existing on-street parking in these cities can be divided into two clear categories: cities that have begun charging for on-street parking and those that have not.

In the cities that currently charge for on-street parking, there are systems with an on-site attendant (someone managing and monitoring payment, typically through a ticket system with different methods of administration) or payment is made through a meter. The most outstanding and progressive case of paid on-street parking is in Mexico City, which is detailed in Case Study 4, followed by examples of rate schemes in other Latin American cities.

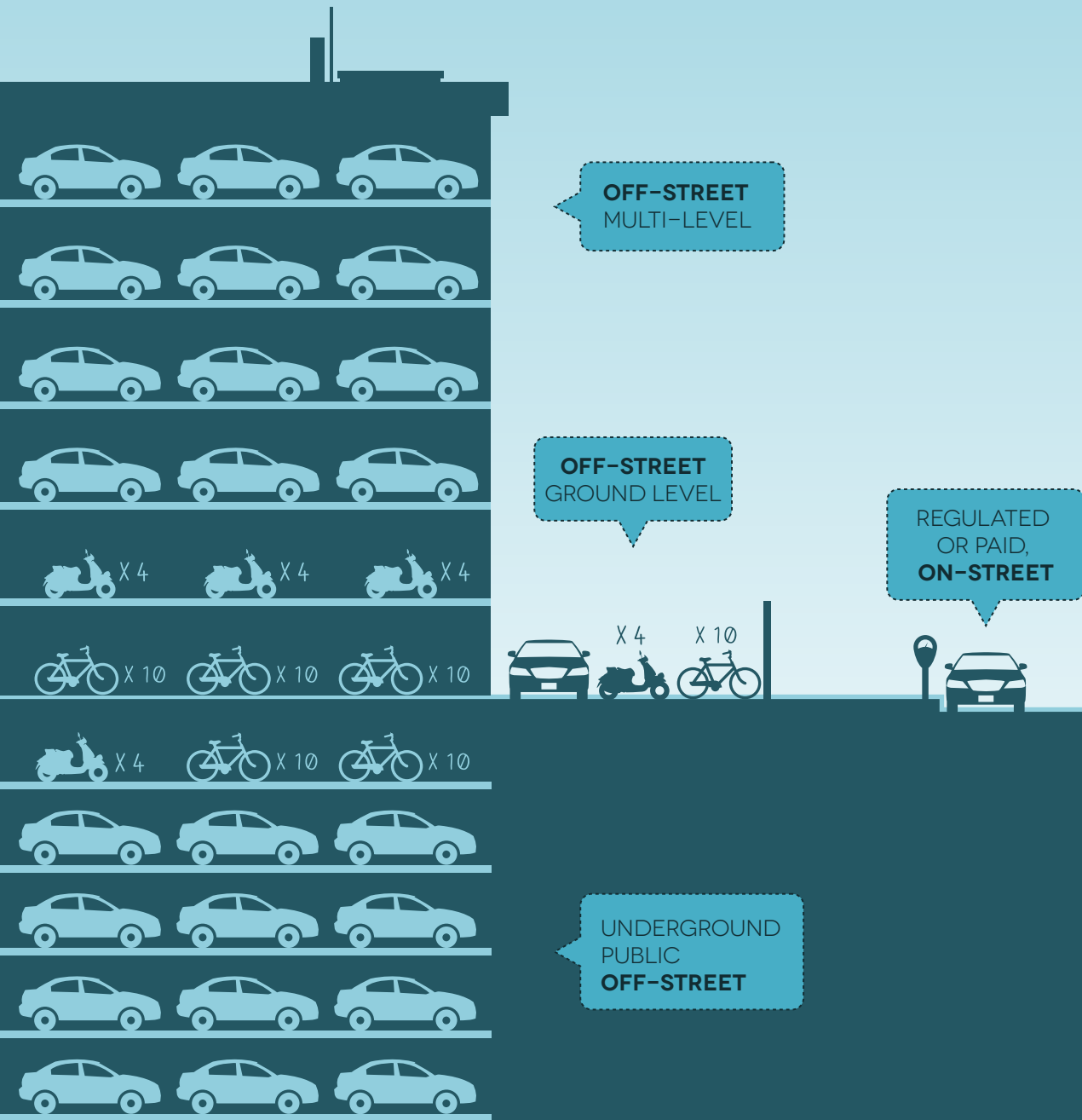


FIGURE 14.
Types of parking in the region

TYPES OF PARKING IN THE REGION

ON-STREET,
INFORMAL



IN PROHIBITED
ZONE



ON-STREET
UNDERGROUND,
RESIDENTIAL,
COMMERCIAL

X 10  X 4  X 4 



Case Study 4: Paid metered on-street parking in Mexico City

NAME OF THE SYSTEM:

EcoParq

BACKGROUND

In most cases, public on-street parking in Mexico City remains legally free. In 2007, the Federal District government placed multi-space parking meters in several Mexico City neighborhoods as part of the city's Green Plan (Plan Verde) mobility initiative. Overall, less than an estimated 10% of the public on-street parking supply is regulated through a rate scheme.

IMPLEMENTATION PROCESS

Bicentenario Parking Operator (OEB), which currently has operations in Polanco, Lomas, Anzures, and Roma Condesa, would receive 70% of the meter-generated revenue, of which 20% would go to the Secretariat of Public Safety for enforcement, for 10 years, in exchange for investment, installation, operation, and maintenance of the system. The remaining 30% of the overall revenue goes to the Public Space Authority for re-investment in neighborhood public spaces. The Committee for Transparency and Accountability decides which projects these funds will be invested in, as required by the Regulation for the Control of Parking on Public Roadways in the Federal District.

Committee members include the Citizens' Committees, Public Space Authority, and Political Delegation in the areas where the parking meters are placed.

In January 2012, 426 multi-space parking meters were installed in Polanco, regulating approximately 6,000 public on-street parking spaces. The project included an extensive communications strategy that included notifying residents through flyers, placing informational kits in parks, developing a user-friendly website, and especially, creating branding around the system name, EcoParq, which distances the project from the bureaucratic image these systems tend to have in Mexico.

RULES OF OPERATION

For visitors

The technology used is multi-space parking meters as part of the pay-and-display program, which requires the user to:

- Enter license plate number.
- Pay for the estimated time they will be parked (limited to three hours, without forced rotation).
- Place the receipt in a visible place on the driver's side dashboard.

The Regulation for the Control of Parking on Public Roadways in the Federal District notes that the Secretariat for Urban Development and Housing determines the zones where EcoParq will be installed, as well as the days and hours the system will operate.

For residents

The Regulation for the Control of Parking on Public Roadways in the Federal District stipulates that all properties within a metered zone that do not have a parking garage have the right to a temporary residential permit, as long as the property is used as a residence.



Figure 15. EcoParq web interface.

Source: www.EcoParq.com.mx

Table 10.
Neighborhood-specific EcoParq rates and operating conditions.

MEASUREMENT	POLANCO	LOMAS	CUAUHTEMOC - JUÁREZ
Hours	8 a.m. a 8 p.m.	8 a.m. to 8 p.m.	8 a.m. to 8 p.m.
Days	Monday to Friday	Monday to Friday	Monday to Friday
Rate (minutes)	US\$0.15 per 15 minutes	US\$0.15 per 15 minutes	US\$0.15 per 15 minutes
Time limit	3 hours	Stage 1: 3 hours Stage 2: 6 hours	6 hours

Permit holders receive a sticker exempting them from meter requirements in the area surrounding their residence for a six-month period, after which the permit must be renewed. This permit does not apply to the entire district.

ENFORCEMENT

Metered zones must enforce the Metropolitan Transit Regulation (RTM-DF), a city-wide regulation, and the Regulation for the Control of Parking on Public Roadways in the Federal District. The Secretariat of Public Safety may use a third party to immobilize vehicles. If fines are not paid, the vehicle may be towed.

The fines are detailed in Table 11.

Drivers incur the same penalties, according to the Regulation for the Control of Parking on Public Roadways in the Federal District, for the following violations:

- The payment receipt is not visible from outside the vehicle.
- The time paid for and displayed on the payment receipt has expired.
- The date of the payment receipt does not correspond to the date of enforcement.
- The vehicle is partially parked outside the metered zone.

Enforcement is carried out by two-person teams: a public safety officer and an EcoParq verifier. Each team is responsible for patrolling an average of six streets during their rounds. If they find a vehicle in violation, they document the violation and notify the team in charge of placing an immobilizing device.

BENEFITS OBTAINED

Once the system is implemented in the entire area, monthly parking meter revenues are estimated at US\$500,000, of which US\$150,000 will be allocated to revitalize public spaces, which may include accessible quality sidewalks, improved parks, lighting, etc.

Table 11.
Vehicle immobilization as a penalty.

SITUATION	AMOUNT
Violation of Article 13 of the RTM	US\$24 (5 days of the current minimum wage)
Removal of immobilization device	US\$14.30
If vehicle is towed	The immobilization device removal fee is not applied and US\$42 is charged for towing plus US\$4.30 per day the vehicle is stored at the tow yard.
Time limit	3 hours



All signs point to the program soon expanding into other sections of the city. Residents in surrounding neighborhoods are supporters of an expansion to curtail spillover of drivers in search of cheaper parking on their streets.

Figure 16.
EcoParq construction.

Figure 17.
Vehicle immobilization as a penalty.



Case Study 5: Regulated parking zone in Medellin

SYSTEM NAME:

Regulated Parking Zones (Zonas de Estacionamiento Regulado, ZER)

DESCRIPTION

These zones have demarcated “cells” with posted signage where on-street is permitted and regulated through payment. The objective is to discourage on-street parking. The system is divided into White Zones and Regulated Parking Zones (ZER).

The White Zones include demarcated parking spaces with posted signage, strictly subject to Article 75 of the National Transit Code, which includes free parking for up to 60 minutes. These zones are adjacent to or near the area of influence, which is defined as any linear block situated adjacent to or near the ZER cells, where on-street parking is prohibited.

The white zones are regulated similarly to the ZER, by Municipal Decree 1111 of 2009 and Resolution 832 of 2009. They are managed and operated by Terminales de Transporte de Medellín S.A.

IMPLEMENTATION PROCESS

Operations launched on June 16, 1999, through a concession contract with a private administrator, Administrador de Zonas de Estacionamiento Regulado (AZER). In 2007, the management and operations of the ZER passed to Terminales de Transporte de Medellín S.A., a mixed public-private municipal company, through an inter-administrative agreement.

Once Terminales Medellín took over administration, the ZERs merged into a joint project including towing and custody of vehicles in an effort to balance costs and revenue, due to losses incurred during custody. The project is called Regulated Parking Zones, Towing, and Vehicle Custody Project, with a 2012 budget of Col\$6,735,960,000 (approximately US\$2.2 million). Terminales Medellín receives 10% plus VAT of total revenues

Figure 18.
Regulated parking zones.



Figure 19.
White zones in Medellín.

from this project. Starting August 3, 2009, Terminales Medellín adopted the credit card terminal system as a new mechanism for ZER enforcement. This replaced the previous machine system. The ZERs have 168 on-site attendants, assigned according to the hours for each ZER, who are responsible for accepting payment from drivers. Additionally, 19 coordinators rotate around the different zones, supervising the operations of the attendants, and these coordinators have direct communication with the Project Manager.

There are currently 1,445 ZER spaces for automobiles and 78 for motorcycles, for a total of 1,523 ZER cells. The hours and rates vary depending on the sector location of the ZER. The general hours are from 7 a.m. to 7 p.m., Monday to Saturday. In zones with night hours, service in the ZER zone is extended to the closing hours of establishments open to the public and educational facilities. The rates range between Col\$2,000 (US\$1.20) and Col\$2,900 (US\$1.61) per hour.

RULES OF OPERATION

ZER users are charged a fee to park on the street. The ticket, however, does not signify liability for any damage or theft while the vehicle is parked in the ZER. The rate is based on a market study that establishes an average for the sector where the ZER is located, and then the rate is set higher than this average.

Figure 20.
ZER enforcers, Medellín.



Case Study 6: Ticketed on-street paid parking in Rosario

NAME OF SYSTEM:

N/A

BACKGROUND

The city of Rosario began implementing a metered parking policy in the Central Area in May 2001, when due to the country's economic crisis, the city decided to lift the prohibition (put in place the previous year) on personal vehicles entering the micro-center during business hours.

This policy had two stated objectives: to discourage vehicles from entering the area by charging for on-street parking, and to prioritize the use of these spaces for limited-duration parking over full-day use by workers or residents by limiting parking time to a maximum of three hours.

IMPLEMENTATION PROCESS

The service concession was granted in 2000 to Tránsito Rosario S.A. Eight years later, through a new bid process, the concession was granted to Tránsito Rosario – Sutech UTE, beginning January 2009. The concessionaire must invest in parking meters, pay the city a monthly fee, and monitor parking violations. The revenue from fines goes into the city general budget.

The zone regulated by the metered parking system has grown, including almost all of the Central Area by 2012.

RULES OF OPERATION

The hours for paid parking are Monday to Friday, 9 a.m. to 9 p.m. and Saturday until 2 p.m. Sundays and holidays are free of charge.

Payment is made with coins or tokens that may be purchased at 120 businesses in the zone and through the Portable Personal Parking Meter via a mobile phone that has been registered online.

The paid parking sector is divided into three zones, as shown in Figure 23.

Zones A and B cover 168 blocks, for a total of 2,200 parking spaces. Zone C covers 261 blocks, for a total of 3,400 spaces.

Paid parking rates (in November 2012):

- **Zones A and B:** US\$0.80/hour. Minimum payment US\$0.20. Maximum time permitted: 3 hours
- **Zone C:** US\$0.50/hour. Minimum payment US\$0.125. Maximum time allowed: 3 hours

Figure 21.

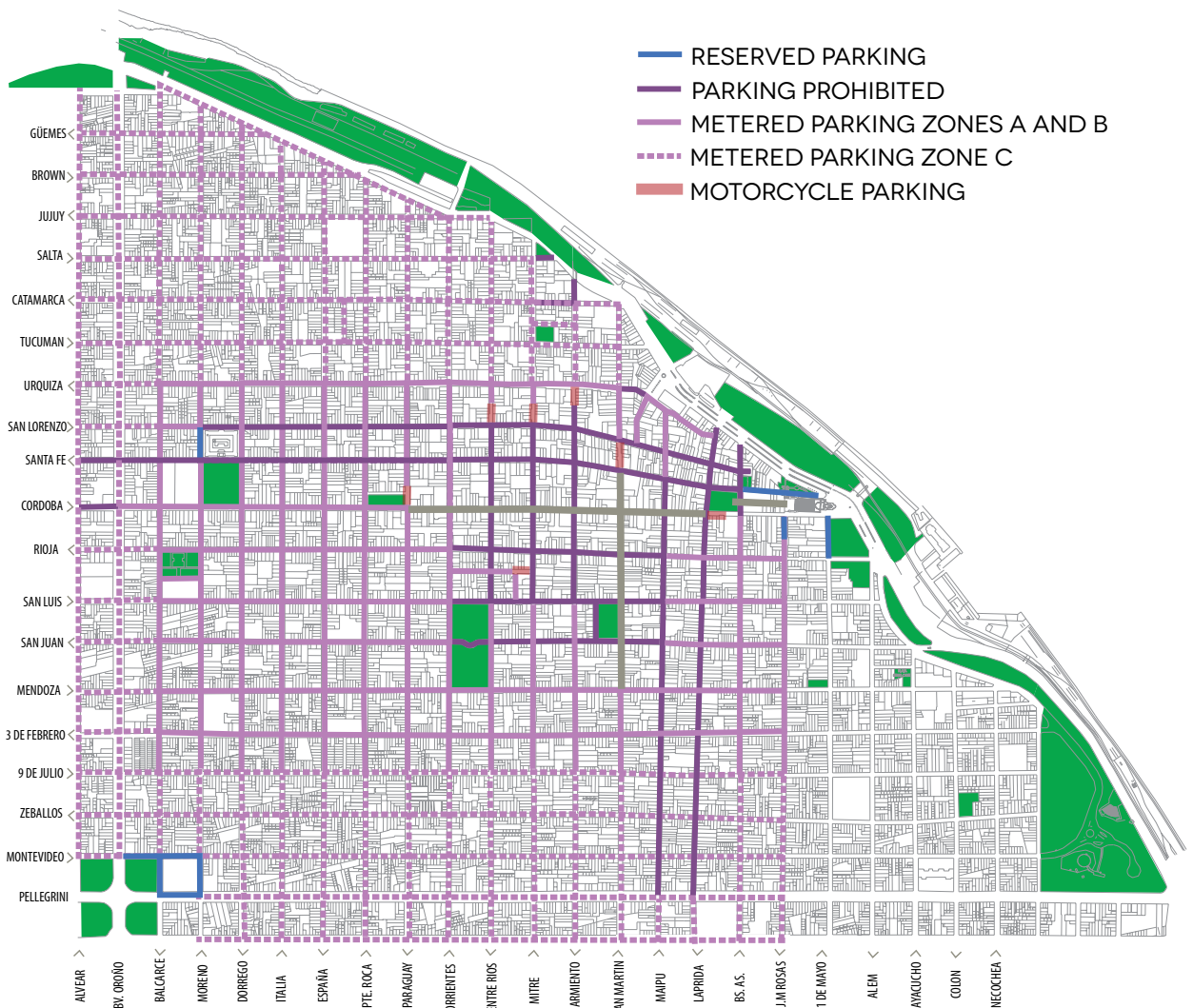
Parking meter in Rosario, machine and sign.





Figure 22.
Metered parking sign – Rosario.

Figure 23.
Metered parking zones – Rosario.
Source: PIM Rosario 2011.



INFORMAL ON-STREET PARKING: THE PROBLEM

Several of the cities in the region also have on-street parking, which is either free of charge or the rate is set by someone who informally provides the parking service. This practice demonstrates that people are willing to pay for on-street parking and that this is a lost opportunity to establish a clear, paid on-street parking policy, or that this opportunity for revenues is being given to a few private parties.

Case Study 7: Informal parking in Bogota

All on-street parking in Bogota is free. A considerable amount of this parking comes with “informal caretakers” made up of small “mafias” working in public spaces. They have taken over on-street parking informally, to “care” for vehicles parked there. These individuals charge a price set by the informal market (in some cases, there are set rates already known to the users) or, in most cases, what the driver is willing to pay.

The inability to enforce parking violations, according to some interviewees, stems from the lack of tow trucks and traffic police capacity in the city. However, it is clear that there is little will to regulate on-street parking.

This situation creates uneven parking regulation efforts in two ways: There is no parking enforcement for vehicles parked illegally or in prohibited areas, and there is no price regulation for on-street parking. However, the electronic violation detection system has decreased the number of parking violations in prohibited areas (no hard data are available on this observation).

Vehicles for people with disabilities are parked on the sidewalks or on the street, as there are few areas in the city with designated disabled parking with proper signage; in areas where designated spaces do exist, these are not properly maintained or marked.



Figure 24. Informal on-street parking is visible even where parking is clearly forbidden.



Figure 25.
Enforcement when vehicles are parked illegally is uncommon, except during specific "operations."

Figure 26.
Informal parking and invasion of public space.



Case Study 8: Informal parking in Buenos Aires

Streets being controlled by “trapitos” (men wearing a cloth draped over their shoulder) in Buenos Aires is nothing new. It is typical to find these people in business zones and, especially, near venues such as stadiums for weekend soccer games or international entertainment shows.

Those who are “in charge” of these on-street sectors have defined zones and set their own prices. A survey of 50 people showed that drivers pay between US\$0.40 and US\$1 per use of those spaces during the day and between US\$1 and US\$2.12 for night-time parking. Some trapitos also offer car washes and charge between US\$4.25 and US\$6.40. The price during events

like soccer games or concerts varies between US\$10 and US\$17 for on-street parking.

Law 4113 sought to create the “Registry for Vehicle Caretakers.” This law was vetoed on February 1, 2012, with the publication of a decree in the Official City Gazette. This vetoed law established that the “vehicle caretakers” could work in spaces selected by the city government. The trapitos had to register and comply with the hours and places assigned by the city. They would have been granted a renewable two-year permit that could be revoked should they violate any rules or commit a crime while on the job.¹⁰

Case Study 9: Informal parking in Monterrey

Similar to other Mexican cities where vehicle use is high when on-street parking is free, Monterrey has seen the emergence of informal public space managers, known as franeleros (vehicle caretakers sporting T-shirts).

Monterrey roadways are regulated by these managers. Citizens admit they feel threatened by them to pay a certain amount for them to “take care of their vehicles.” The rate varies by zone, time of day, and the day of the week. During special events like concerts and soccer games, the rate is higher and may go as high as US\$3.85 to US\$8. The franeleros attend to the drivers at the event entrance, but it is difficult for them to stay on site watching the vehicles until the end of the event.

There are rumors of the franeleros being subject to police extortion, with reports that officers demand payment quotas from informal managers to allow the managers to cordon off and profit from parking spaces. According to news articles, these quotas can account for up to half of their revenues. Even in metered zones, there are franeleros on-site declaring that they are authorized by safety and inspection officials.

¹⁰ “The law cannot allow people to charge for parking in areas where parking is free, and even less so by fixing the price,” stated the Chief of Cabinet of the City of Buenos Aires. “There are many reports of extortion and coercion. There are those who look after the vehicles in good faith, but we also know there are mafias.”



Figure 27.
"Trapitos" in Buenos Aires.



Figure 28.
"Franeleros" in Monterrey.

Case Study 10: Off-street parking in Sao Paulo, operated by the private sector for the government

Municipal garages have been a subject of debate in Sao Paulo since 1988. At that time, the mayor wanted to build 12 underground garages, but he faced a lack of business interest, difficulty garnering approval from the municipal Secretariats, and protests over the possible impact the garages might have on the vegetation or landscaping quality of the plazas under which they would have been built. For these reasons, the project was abandoned (Estadão 07/04/2011; Antunes 2000).

Two of the planned underground garages were opened in 1999 under the management of a consortium of private companies. These were the first two underground garages built through a public concession in Brazil. Together, they have a total of 1,210 spaces (700 in Hospital das Clínicas and 510 in Praça Alexandre Gusmão).

In July 2012, the Municipal Transportation Secretariat (SMT) announced a referendum on the tender for the implementation, maintenance, and operation of three public parking facilities in central Sao Paulo, located in Mercado Municipal, Praça Fernando Costa, and Praça Roosevelt. The construction of these garages was part of the city center revitalization efforts, which sought to guarantee "the people ample access to public spaces and enhance their use, in response to the need to eliminate the vehicles traveling and parking in these areas, thereby creating a more efficient flow on surrounding roadways" (SMT 2010).

Over all, the three garages will expand the parking supply in the area by 1,379 spaces. The proposed model is a concession over 30 years. The investment comes from a private initiative, with monthly payments to be made to the city, based on a variable annual payment, at a variable percentage between 5% and 27%, depending on gross business revenue.

OFF-STREET PARKING BASED ON LAND USE

Off-street parking facilities that are not a “business” where shared parking can be encouraged but are, rather, directly tied to land use are a real problem because, as previously stated, parking requirements per housing unit (or based on any other criterion) tend to be very high and are generally set as minimums instead of maximums. This report reviewed the requirements for different land uses in each city, comparing them to one another and with other cities across the globe. The resulting data was used to construct the chart below.

Chart 5 shows the parking requirements per housing unit, based on three unit sizes, for each city studied.¹¹

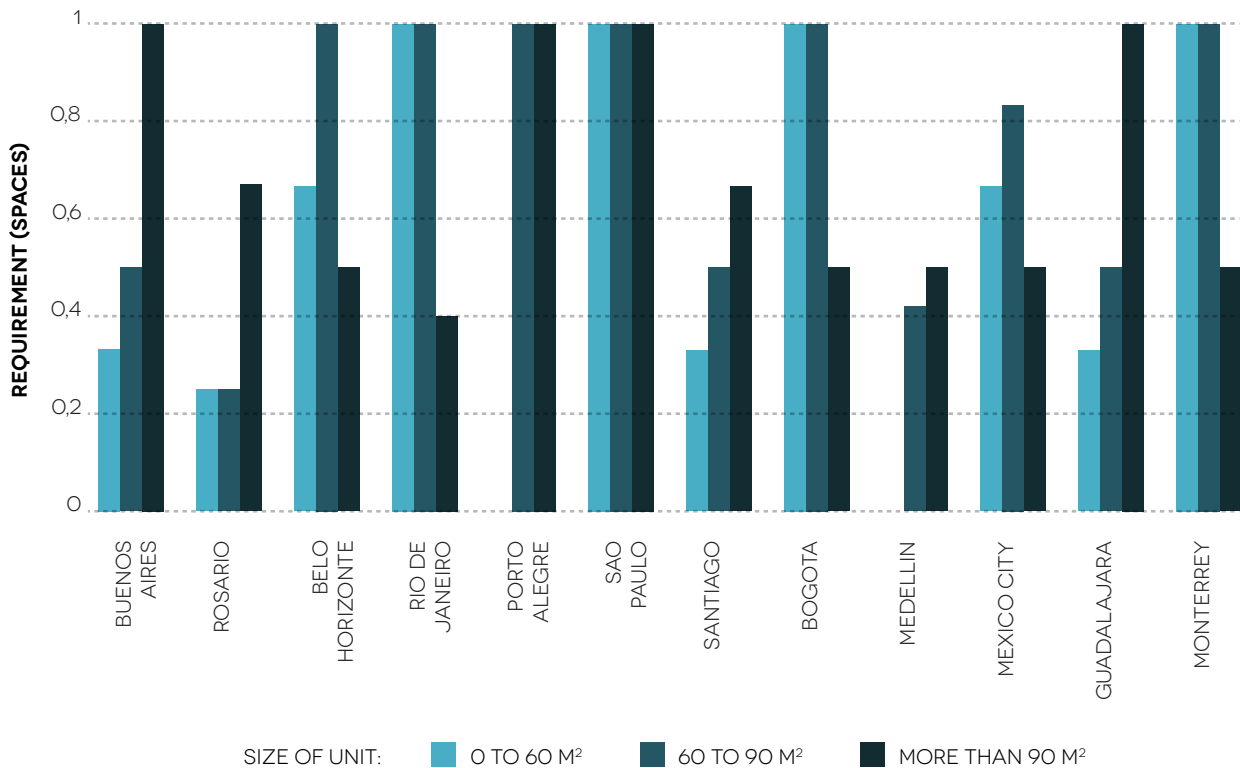


Chart 5.
Housing unit requirements per parking space.
Source: Prepared by the authors.

¹¹ City data were aggregated for comparison purposes.

Chart 6 is similar to Chart 5, but differs in that it shows the number of square meters of commercial construction that can be developed per parking space required.¹² For Buenos Aires, Bogota, and Medellin, the requirements are much more logical (in terms of a coherent parking policy) than those of the other cities. Mexican and Brazilian cities are the worst off, given the limited amount of commercial development that could be achieved per parking space required.

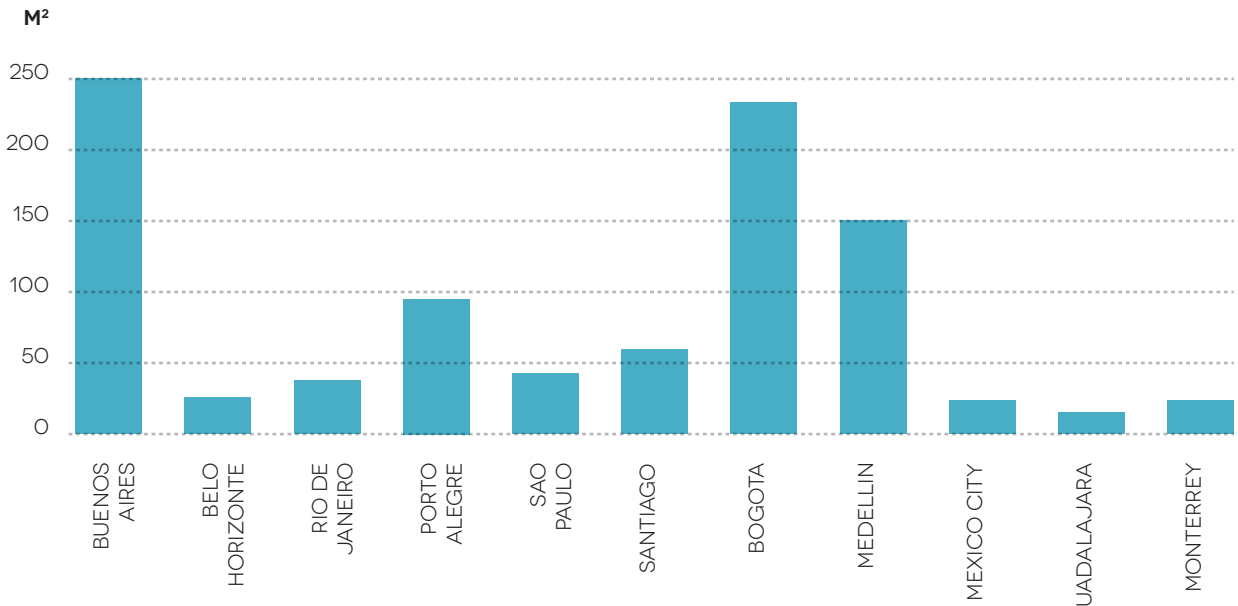


Chart 6. Commercial requirements (m² built) per parking space.¹³

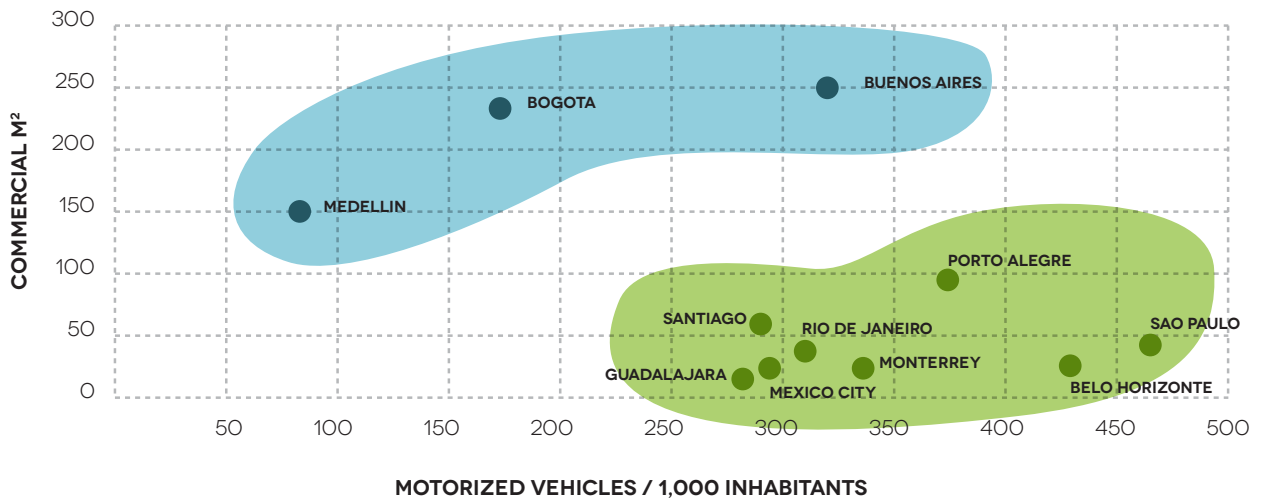


Chart 7. Square meters of commercial development permitted per parking space vs. motorization.

¹² When commercial use was differentiated between shopping centers or other uses, data were aggregated for comparison purposes.

¹³ This chart is "inverse" to other charts on this issue (the parking space is the fixed value), because it was the best way to compare existing regulations.

Chart 7 assesses whether or not there are comparable data or if there is a relationship between motorization, on the horizontal axis, and parking requirements, in the vertical axis, for each city studied.

Chart 8 makes a similar comparison, but also includes data from Asian cities taken from Barter 2011 study (using parking requirements per 60m² housing unit [small] as the baseline).

There are also two noteworthy cases in which “reductions” have been proposed to these requirements, through other offset opportunities in Bogota and Mexico. Below is a description of these instruments.

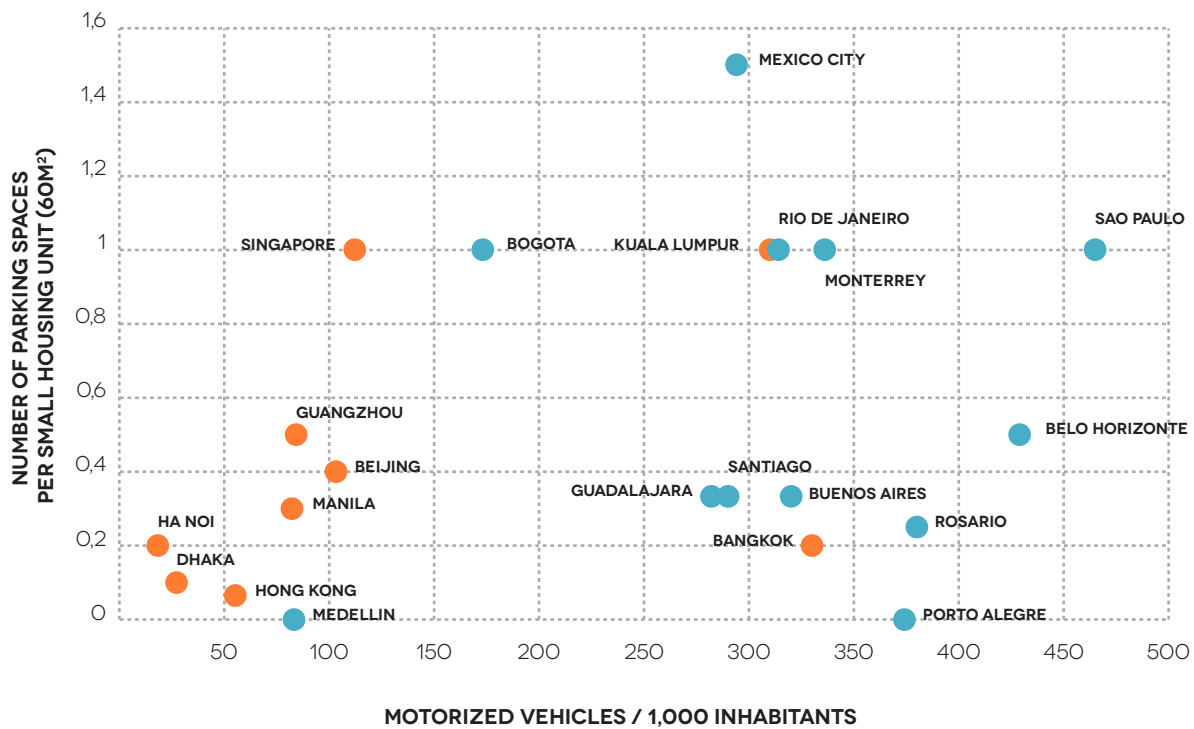


Chart 8. Housing and motorization requirements in Latin America and Asia. Source: Prepared by the authors, with data from Barter (2011).

Case Study 11: Parking offset fund in Bogota

The Parking Offset Fund aims to manage resources for providing public parking. These resources are allocated to acquiring, co-financing, building, maintaining, and adapting parks, equipment, and property for public parking. The resources for this fund come from fines paid by properties (whose building and urban permits were granted by the urban planning office) that do not provide sufficient parking. The Institute for Urban Development has the authority to develop off-street parking projects on behalf of the District, in keeping with the minimum underground parking requirements set by the District Secretariat of Planning.

The implementation of this instrument has been challenging, since public parking facilities do not have a price control for users. However, the charging mechanism is put in place through the building or zoning permit granted by the Urban Planning Office. The purpose of these funds is to build parking to meet the demand, but the funds are currently frozen because the Institute for Urban Development has not undertaken any new construction projects for new parking due to the review of the Land-Use Plan.

Case Study 12: Disincentive for vehicle use in Mexico City

The Secretariat of Urban Development and Housing of Mexico City (SEDUVI) set the goal of “promoting a new urban order and enhancing the city’s environment” and “promoting investment and the development of services” in certain corridors with varying modes of public transportation. It proposed the possibility of signing an agreement that would grant the following discounts, or reductions, in the minimum parking requirements for office and commercial building developments in the following corridors and zones in the city.

The reductions would be granted to properties in these zones or corridors in exchange for payment set by the SEDUVI Directorate General for Urban Management. Although the agreement was not signed or published in the Official Gazette, it was a step forward by the government showing interest in addressing problems posed by minimum parking requirements for new parking structures, as established by the Additional Technical Regulations for the Architectural Project of the Building Code. Table 12 displays the numbers for the proposed reductions to requirements by city zone.

Table 12.
Reductions in requirements by zone in Mexico City.

ZONE / CORRIDOR	BASE	CETRAM (Modal Transfer Station)	TREN SUBURBANO (Commuter rail)	STC METRO	METROBUS (BRT)	ZERO-EMISSION TROLLEYBUSES	ECO BUSES	ECOBICI PROGRAM (BIKESHARING)	TOTAL
Historic areas	100%	—	—	—	—	—	—	—	100%
Areas with critical service level	20%	*	*	*	*	*	*	*	20%
CETRAM	20%	40%	—	—	—	—	—	—	60%
Paseo la Reforma	20%	—	—	30%	—	—	5%	2%	57%
Insurgentes	20%	—	30%	—	10%	—	—	2%	62%
Eje Central Lázaro Cárdenas	20%	—	—	30%	—	5%	—	—	55%
Vallejo - Cuauhtémoc (Eje 1 Pte.)	20%	—	—	—	10%	—	—	—	30%
Xola (Eje 4 Sur)	20%	—	—	—	10%	—	—	—	30%

Case Study 13: Buenos Aires discourages personal vehicle use in the city micro-center

In February 2012, the city re-instated a measure that restricts the use of vehicles in the micro-center from 11 a.m. to 4 p.m. Buses and taxis are authorized to circulate in the micro-center, as are motorcycles, emergency vehicles, funeral vehicles, mechanic service vehicles, armored vehicles, daily distributors, and school transportation. The fine for violations is US\$38.25.

This measure is part of the pedestrianization plan, which encompasses 100 blocks (43 in the first stage) of the zone demarcated by Avenida de Mayo, 9 de Julio, Leandro N. Alem,

and Santa Fe. The project is expected to be completed in June 2015. The plan has three phases – the first of which is vehicle restrictions – and it is set to be finalized in June 2015. The city must re-organize bus routes that currently go through the micro-center, but this requires that the city reach an agreement with the national government.

The cases presented above reveal the need to understand TDM and implement its instruments throughout the whole region. There must be a breaking point for related policies to change that will create more favorable conditions for their implementation, and for additional similar instruments to be put in place.

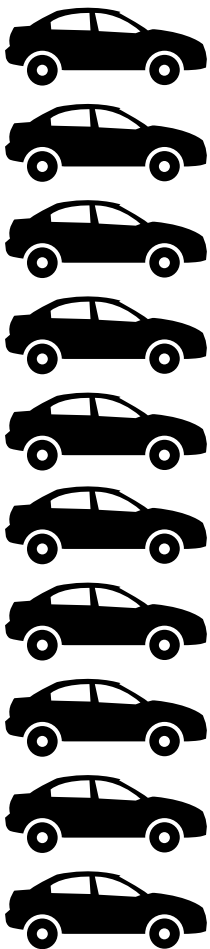
ADDITIONAL NOTEWORTHY POLICIES

There are a few noteworthy parking measures and policies that stand out as best practices in the region.

BICYCLE PARKING REQUIREMENTS

Several of the cities studied had specific requirements for bicycle spaces in parking facilities, which was an unexpected finding. Chart 9 compares the requirements for bicycle parking for every 10 automobiles or private vehicle parking spaces constructed.

**FOR EVERY
10 CARS**



**THE REQUIRED NUMBER OF
BICYCLE PARKING SPOTS IS:**



0,27

ROSARIO



0,5

BELO HORIZONTE
SAO PAULO



1

SANTIAGO
PORTO ALEGRE
BOGOTA
MEDELLIN



2,5

RIO DE JANEIRO



4

GUADALAJARA

ON-STREET PARKING

Mexico City and its EcoParq project are the best examples of good practice. The most outstanding aspect of the measure is the re-investment of revenue generated, of which 30% is allocated to improvements to public spaces decided upon by the community. Several aspects bear noting: i) the government is responsible for the equal redistribution of resources, ii) the concessionaire acts as the operations mediator, and iii) the community is actively engaged in deciding how the subsidy will be used. This case should be considered a very good practice that could be replicated in the rest of Latin America. Table 13 shows some figures from the case studies.

Table 13.
Revenue and reinvestment in some cities.
Source: Prepared by the authors.

MEXICO CITY	30% of revenue goes to the Public Space Authority for re-investment in neighborhood public space. The estimated monthly meter income for Colonia Condesa was MXN\$6.5 million (US\$492,000), of which MXN\$1.9 million (US\$150,000) is allocated to the revitalization of public spaces, such as quality accessible sidewalks, improved parks, lighting, etc.
SAO PAULO	Approximately R\$61 million is generated per year (US\$29.5 million, in 2011) by the Blue Zone. These revenues account for around 10% of the city's transportation department budget (Buendía 2012).
PORTO ALEGRE	20% of the funds raised by rotary parking are used to promote educational activities about transportation (the remaining 80% is retained by the operator).
BOGOTA	Although there is some revenue, there is no clear definition as to the use of the parking offset fund, and the revenues generated are "frozen" with no specific use.

USE-SPECIFIC PARKING REQUIREMENTS

Rosario, Santiago, Guadalajara, and Buenos Aires have coherent parking policies with requirements for small housing units. Rosario, Medellin, and, to a certain degree, Santiago, Buenos Aires, and Guadalajara also have coherent policies in place for the next level up, i.e., medium-sized housing units.

STREAMLINING OF THE VEHICLE FLEET

The Streamlining of the Vehicle Fleet program in Medellin was established by Decree 2130 of 2004, with the aim of reducing surplus of Collective Passenger Public Transportation vehicles. The goal is to enhance local quality of life by guaranteeing quality transit services. Every company legally authorized to provide collective transit service was required to take a certain number of vehicles out of circulation, based on the Index for the Reduction of Surplus, to adjust transportation capacity to actual demand. The city also created the Streamlining Fund to purchase vehicles coming out of circulation through resources obtained from the Streamlining Factor to Optimize Service Quality. This was rolled into the fare for Collective Passenger Public Transportation between 2005 and 2007.

Challenges in Latin America

Table 14 shows the various factors that, according to the study, have been challenging in the implementation of TDM measures in general (these are also useful for analyzing parking policies). This table also proposes recommendations for overcoming these obstacles.

ISSUE	CURRENT SITUATION	RECOMMENDATION
Trade associations and private sector – predominant role	This refers to the private sector (parking operators). The role of these associations has been to lobby the government to implement “improvement” measures for the sector, which, in some cases, lend themselves to congestion reduction, but not always. The primary concern of the associations is to organize the sector, to have a unified voice, and to maximize earnings.	The association position should be taken into account, but additional analyses should be carried out to promote a coherent policy that is beneficial for everyone (private and public sectors, and citizens).
Land developers	Lack of policies that integrate builders in the drafting of beneficial parking policies.	Builders should be included, given the commercial benefits (e.g., reducing requirements lowers property costs and sales costs), benefits to consumers (the same measure boosts access to housing), and improving trip demand (lower requirements reduce car trip demand).
Roles among actors	The role of the government and its policy positions is often very prominent in decisions made about technical issues on TDM and parking policies.	Balance the distribution of roles among actors: government, academia, organizations, and civil society. Study ways to reduce the political pressure stemming from policy measures and improve implementation conditions for measures that are technically appropriate but controversial due to additional charges or higher vehicle fees.
Policies and technical capacity	TDM policies are outdated in terms of effectiveness, logic, and whether they respond to current transportation needs in the region. Municipal governments have little technical capacity.	It is essential to improve city technical capacity surrounding these issues in order to modernize TDM policies. City employees and decision-makers must be trained.

Table 14.
Key implementation topics. (Continues on next page.)

ISSUE	CURRENT SITUATION	RECOMMENDATION
Motorization	Motorization is growing in Latin America. This reality must be recognized. To confront this challenge, there must be coherent measures to improve transit conditions in the region's cities. Policies and measures taken in the region are often modeled on North American urban development and transportation planning.	Motorization is a challenge, and the timing is perfect for the region to act. The measures should not increase the infrastructure supply (roadways or parking facilities) but, rather, focus on TDM. Refocusing policy is difficult, but indispensable for preventing further problems of congestion, induced demand, energy costs, and negative externalities. If policies are not reshaped, the social and monetary costs will be much higher (and more difficult to reduce) in the medium term.
Requirements for use-specific parking	It is clear that there are no parking requirement policies consistent with the principles of TDM. The fact that there are still minimum parking requirements, that governments very rarely make exceptions, and that there are no cases of established maximum parking requirements shows that there is still much to be done.	Implement maximum requirements through the relevant entities (planning departments or similar bodies).
Inefficient use of resources	The cities studied have implemented less than favorable measures for using parking as a TDM tool. They have increased the parking supply, often by using public resources and by contracting out through concessions.	The use of government resources is significant, especially when spent on building underground or multi-level parking infrastructure. This practice must be reduced as much as possible, both for technical reasons (the parking surplus must be reduced) and fiscal reasons (public resources should not be invested in unproductive infrastructure).
International cooperation	There were some cases of evident support from international organizations (particularly NGOs like ITDP, CAI-LAC, and others such as ECLAC) that supported the analysis of existing measures in some cities (specifically, those in Argentina, Brazil, Mexico, and Chile).	This cooperation should be harnessed to catalyze opportunities to improve in this area, especially technical capacity and the effective implementation of policies.

Table 14.
Key implementation topics. (Continued.)

LESSONS LEARNED

There are several lessons to be learned from the region, particularly regarding ineffective measures and policies that have, in fact, created more rather than reduced congestion.

LICENSE PLATE RESTRICTIONS

The most common TDM measure employed in the region¹⁴ is license plate restrictions, which attempt to reduce environmental damage and traffic congestion. However, its implementation in addressing both problems has produced adverse effects. In an effort to make improvements, not only have funds and valuable time been spent, but motorization has grown and, therefore, rush-hour congestion along with it. The lesson is to not insist on the implementation of license plate restriction measures.

URBAN HIGHWAYS

The case of Mexico includes examples of investing in urban highways. For years, Mexican cities have addressed congestion problems by expanding land allocated for the mobility of private motor vehicles. This was through the construction of bridges, overpasses, new streets, second levels, or urban highways. The enormous investment could have been used more efficiently to improve the mobility of people in the country's metropolitan areas. Unfortunately, the benefits over time have been limited and traffic volume has risen.

PARKING EXCESS SUPPLY

This is an almost omnipresent measure in all case studies and is challenging in terms of parking policies. A typical way for cities to address parking issues is to assume that if there no parking spaces available, and many vehicles circulating to find a free space, the solution would be to expand the parking supply. The real effect of increasing parking supply is an induced demand for parking and increased traffic, which, in turn, may be interpreted as a need for more parking spaces (Shoup 2005). The lesson, therefore, is to raise the price for parking and maintain the parking supply at lower levels. Additionally, the price should be set for all authorized on-street parking in the city.

¹⁴ This is described as the most “commonly employed” measure because Latin America actually does not have demand management measures aside from what is described in this document. The fact that there are more than 10 license plate restriction programs makes this mechanism the most prevalent in the region.

CONSTRUCTION VS. MANAGEMENT

As a continuation of the previous point, it bears noting that building off-street parking facilities is ineffective if on-street parking has not been properly managed; i.e., drivers will not use off-street parking if they know there are free on-street spaces nearby. The only reason drivers would pay for off-street parking would be for safety.

ENFORCEMENT

Enforcement was non-existent or ineffective in most of the cities (lacking capacity, few resources for enforcement, etc.). This component, as demonstrated, is essential for an effective parking policy. Without it, there will be no progress or – even worse – there may be increases in informal or illegal parking.

PROPOSALS FOR CONGESTION CHARGE

Congestion charging represents one of the most effective TDM measures. However, it is also one of the most controversial and difficult to implement, given the political implications of the additional fees drivers must pay. Studies have been performed in recent years in Sao Paulo, Bogota (Wessels, Pardo et al. 2012), and Santiago (Steer Davies and Gleave 2009) to address this measure. At the date of publication, Bogota and Santiago were developing a detailed charge scheme. Despite what has been described in this analysis, this type of scheme could be a sign of greater sophistication in TDM policy making in Latin America and is seen as a positive way of implementing effective congestion-reduction instruments in the region.

References

REFERENCES

- Antunes, E. (2000). Underground parking policy. *Engineering magazine*, 541.
Available at <http://www.brasilengenharia.com.br/palavrgarsub541.htm>.
- Arnold, R., Smith, V., Doan, J., Barry, R., Blakesley, J., de-Corla, P., Muriello, M., Murthy, G., Rubstello, P., & Thompson, N. (2010). Reducing Congestion and Funding Transportation Using Road Pricing In Europe and Singapore. In *America Trade Initiatives* (Ed.), (pp. 72). Alexandria, VA.
- Barter, P. (2011). Parking policies in Asian cities. In *Asian Development Bank* (Ed.), (pp. 112). Filipinas.
- Britton, E. (1994). Thursday: A breakthrough strategy for reducing car dependence in cities. Retrieved from <http://worldstreets.wordpress.com/2009/10/14/car-free-days-2-thursday-a-breakthrough-strategy-for-reducing-car-dependence-in-cities/>
- Broadbuss, A., Litman, T., & Menon, G. (2009). *Gestión de la Demanda de Transporte*. Documento de entrenamiento. Eschborn: GTZ.
- Bull, A. (2003). *Congestion de tránsito. El problema y cómo enfrentarlo*. Santiago de Chile, Chile: CEPAL & GTZ.
- Campodónico, H. (2009). *Gestión de La industria petrolera en períodos de altos precios del petróleo en países seleccionados de América Latina*. Santiago de Chile.
- City of Seattle. (2008). *Best practices in transportation demand management*. Seattle, USA.
- Colin Buchanan Consultores. (2008). *Estudio sobre los beneficios energéticos y medioambientales del "car-sharing"*. Madrid.
- Dalkmann, H., & Branningan, C. (2007). *Módulo 5e: Transporte y cambio climático*. Eschborn: GIZ.
- Environmental Defense Action. (2008). *Congestion pricing facts*. In *The Legislative Gazette* (Ed.). Albany, NY: Environmental Defense Action,.
- Fox, C., Millard-Ball, A., Murray, G., Ter, J., & Burkhardt, J. (2005). *Car-sharing: where and how it succeeds*. Washington: Transit Cooperative Research Program –TCRP-.
- Gallego, F., Montero, J. Salas, C. (2011). *The Effect of Transport Policies on Car Use: Theory and Evidence from Latin American Cities*. Santiago: Universidad Católica de Chile. [Efectos de Políticas de Transporte en uso de automóvil: teoría y evidencia de ciudades de América Latina]
- GIZ. (2011). *International Fuel Prices 2010/2011* (7th ed.). Eschborn: GIZ.
- GIZ. (2013). *International Fuel Prices 2012/2013* (8th ed.). Eschborn: GIZ.
- Kodrinsky, M., & Hermann, G. (2011). De la disponibilidad a la regulación de espacios de estacionamiento: el cambio de políticas en las ciudades europeas. In *ITDP* (Ed.), (pp. 84). New York.
- IMF (2013). *Energy Subsidy Reform: Lessons and Implications*. Working Paper [Reforma de Subsidios Energéticos: Documento de Trabajo].
- Litman, T. (1999). *Evaluating car share benefits*. Victoria: Victoria Transport Policy Institute.

- Litman, T. (2011). Pay-as-you-drive. Vehicle insurance in British Columbia. In Pacific Institute for Climate Solutions (Ed.), (pp. 28): Victoria Transport Policy Institute.
- Medina, S., Instituto de Políticas para el Transporte y el Desarrollo México, & Embajada Británica en México. (2012). Transformando la movilidad urbana en México: hacia ciudades accesibles con menor uso del automóvil. Mexico: ITDP.
- “New” parking project. Estate of Sao Paulo. Available at:
<http://www.estadao.com.br/noticias/impresso,novo-projeto-para-garagens,702732,0.htm>
- Otero, D. (2009). El mito del subsidio a la gasolina y el ACPM. Working Paper. In Departamento de Economía Facultad de Ciencias Económicas Administrativas y Contables (Ed.), (pp. 35). Bogota: Universidad Central.
- Pardo, C. (2012). Gestión de la demanda de transporte: oportunidades para mitigar la contaminación del aire y mejorar la calidad de vida en América Latina. In Clean Air Institute (Ed.), (pp. 75). Washington.
- Richards, M. G. (2006). Congestion charging in London: the policy and the politics. Houndmills, Basingstoke, Hampshire; New York: Palgrave Macmillan.
- Rye, T. (2011). Gestión de estacionamientos: una contribución hacia ciudades más amables. In GIZ (Ed.). Bonn. s.a. (s.a.). Road charging scheme: Asia-Singapore.
- Shoup, D. C., & American Planning Association. (2005). The high cost of free parking. Chicago: Planners Press, American Planning Association.
- Steer Davies and Gleave (2009). Tarificación Vial por Congestión para la Ciudad de Santiago: informe final, resumen ejecutivo. Santiago de Chile: Steer Davies and Gleave.
- Transport for London. (2005). Central London congestion charging. Impacts monitoring. Third annual report. Mayor of London,.
- Transport for London. (2010a). Consultation results. Londres: Transport for London,.
- Transport for London. (2010b). Mayor confirms removal of Congestion Charge Western Extension Zone by Christmas and introduction of CC Auto Pay in New Year. London: Transport for London.
- Turner, D. (s.a.). London congestion charge: A model for American cities. Paper presented at the Transportation Finance Summit.
- Transport Municipal Secretariat (2012). Conference record N° ###/12 – Administrative process N° 2010-0.349.079-0. Common concession for the implementation, maintenance and operation of public parking meters at municipal market of Sao Paulo, Plaza Fernando Costa and Plaza Roosevelt. Available at: http://www.prefeitura.sp.gov.br/cidade/secretarias/upload/chamadas/minuta_edital_smt_-_concessao_estacionamentos_subterraneos_1343423333.pdf.
- Weinberger, R., Kaehny, J., & Rufo, M. (2010). Políticas Estadounidenses de Estacionamiento: Una visión general sobre las estrategias de gestión. New York: ITDP.
- Wessels, G., Pardo, C. F., & Bocarejo, J. P. (2012). Bogotá 21: Hacia una metrópolis de clase mundial orientada al transporte público (C. A. Moreno, Trans.).
- Zegras, C. (2006). Private Sector Participation in Urban Transport Infrastructure Provision. Eschborn: GIZ.

The Inter-American Development Bank Regional Sustainable Transport Action Plan was launched in 2010 to guide client countries on issues of climate change mitigation and adaptation in IDB transport operations.

Its activities include seminars, workshops, knowledge products, and IDB personnel and client training.



This guidebook is the result of a study carried out in 12 cities across five countries throughout Latin America (Argentina, Brazil, Chile, Colombia, and Mexico) looking at parking and travel demand management (TDM) policies. It serves two main objectives: to present the general findings of the fieldwork carried out in the focus cities, comparing their policies to similar policies implemented in other cities around the world (Europe, Asia, and North America), and to propose recommendations for implementing TDM, specifically, parking policies in Latin American cities looking to reduce traffic congestion, improve economic development, and provide greater benefits to their inhabitants.

Based on these clear objectives, this guidebook shall serve as a support document and work tool for the various government entities, decision-making stakeholders, and heads of planning and development policy and transportation and urban planning projects.

