



The Opportunity of Reforming Parking

A Taming Traffic Deep Dive Report



ACKNOWLEDGEMENTS

AUTHOR

Dana Yanocha, ITDP

CONTRIBUTORS

Alicia Glassman, ITDP

Daniela Gonzalez, ITDP

REVIEWERS

The authors thank the following experts who generously provided their time and insights, which strengthened the quality of this report.

Stanley Chanzu, ITDP AFRICA

Clarisse Linke, ITDP BRAZIL

Lorena Freitas, ITDP BRAZIL

Shaokun Liu, ITDP CHINA

Jacob Mason, ITDP GLOBAL

Taylor Reich, ITDP GLOBAL

Madeline Liberman, ITDP GLOBAL

Parin Visariya, ITDP INDIA

Rahmad Wandu Putra, ITDP INDONESIA

Emilio Romero, ITDP MEXICO

Any errors or flaws in the end product are the responsibility of the authors alone.

PUBLISHED SEPTEMBER 2024

SOURCE: oliverdelahaye via
Shutterstock

CONTENTS

1	INTRODUCTION: THE PARKING STATUS QUO	4
	Background	5
2	WHAT IS PARKING REFORM?	7
	How is parking managed?	8
	Who manages parking?	9
	What tools can be used to reform parking?	10
	Myths about parking reform	11
3	ACTION ITEMS TO IMPROVE PARKING MANAGEMENT	13
	ACTION 1 Establish a Coordinated Vision for Parking	14
	ACTION 2 Manage On- and Off-Street Parking Together	15
	ACTION 3 Understand your Parking Picture Through Data	18
	ACTION 4 Carefully Structure Funding and Revenue	19
4	CASE STUDIES	20
	Zurich, Switzerland	20
	San Francisco, United States	23
	Mexico City, Mexico	25
	Montreal, Canada	26
	Kigali, Rwanda	28

INTRODUCTION: THE PARKING STATUS QUO

1

Space in cities is a valuable and limited resource. However, in many cities, one third or more of the land is allocated to storing parked private vehicles, including cars and motorized two-wheelers.¹ Drivers and non-drivers alike might underestimate the true scale of the space allocated to private vehicles, but it makes up a large amount of usable land in cities. This vast amount of space dedicated to cars and two-wheelers—both for driving and parking—has shaped the built environment of urban areas in a way that prioritizes vehicles over people.



FIGURE 1. Parking space marked in red in four neighborhoods of Edmonton, Canada.
SOURCE: Ashley Salvador

For example, Figure 1 shows in red the area allocated to parking in different neighborhoods of Edmonton, Canada. In Indian cities, where surface parking lots are less common, several floors of multistory buildings are often reserved for parking. And in Mexico City in 2014, 42% of the floor space in new buildings was not usable housing, retail, or commercial space but parking.²

Successful urban transportation systems provide safe, equitable access to destinations, activities, goods, and services. They minimize environmental harm, use resources efficiently, and mitigate negative health impacts. Parking policies should align with this framework; however, in many cities, parking policies contribute to traffic congestion, air pollution, inefficient use of space, and dangerous environments for people outside of cars.³ To effectively manage parking in line with these values, planners must balance supply and demand for parking and curb use.

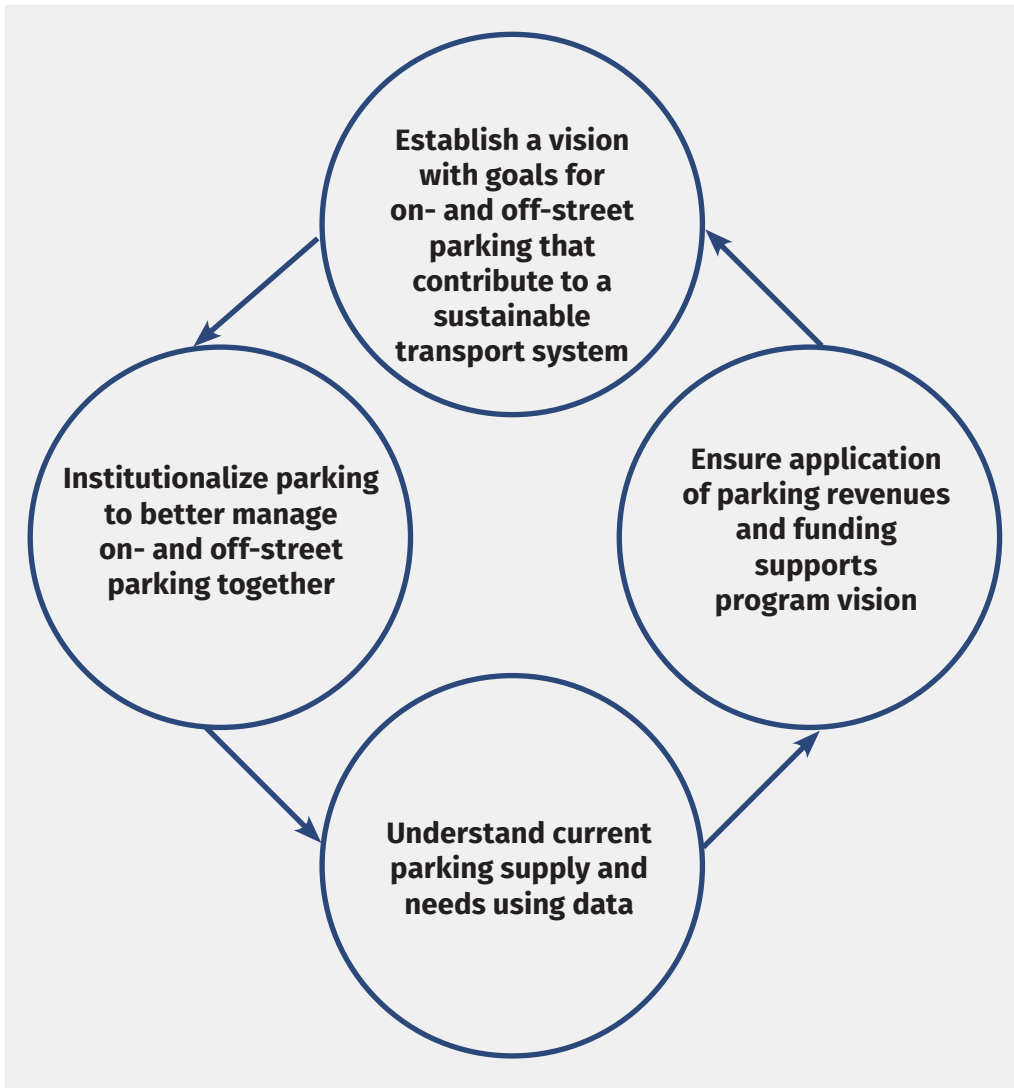
This report helps city planners, practitioners, and decision-makers design policies to improve parking management by addressing on-street and off-street parking together. Both types of parking are deeply intertwined.

1 ITDP. (2023) [Breaking the Code: Off-Street Parking Reform](#).

2 ITDP. (2020) [Más Ciudad, Menos Cajones – Evaluación de impacto del cambio a los requerimientos de estacionamiento en la Ciudad de México y recomendaciones de política pública](#).

3 Parking Reform Network. (2023) [What is Parking Reform?](#)

Managing parking more comprehensively can induce a paradigm shift, where people and places are subsidized instead of parking and cars.⁴ To this end, cities should:



Background

Vehicle use and ownership are growing globally, especially in rapidly urbanizing areas. If the current patterns of car ownership persist, it is projected that there will be nearly 1.8 billion cars on the world's roads by 2050 (see Figure 2).⁵ Countries with rapidly growing rates of vehicle ownership include Vietnam (17%), China (14%), and India (10%).⁶ These countries also tend to have very high rates of sustainable transport (public transportation and walking), which are declining as car ownership and income grow.

4 Shoup, Donald. (2017) [The High Cost of Free Parking. Updated edition.](#)

5 ITDP. (2024). [The Compact City Scenario – Electrified.](#)

6 The International Organization of Motor Vehicle Manufacturers. (n.d.). [Motorization Rate 2020 - Worldwide.](#)

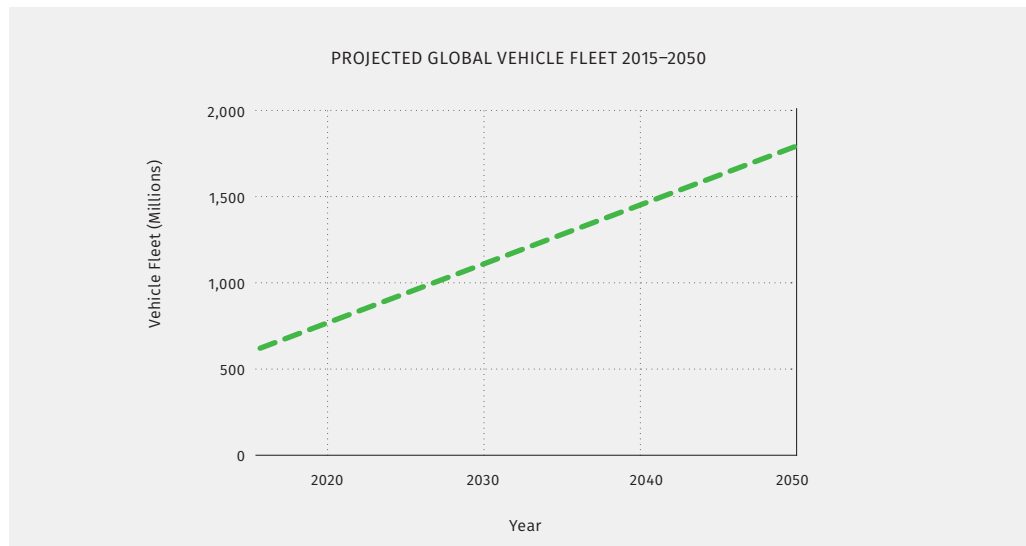


FIGURE 2. Projected growth in vehicles around the world
SOURCE: ITDP data

Rapid and expanding growth of car ownership begets policies that directly subsidize and encourage car use, fueling a cycle of even more car ownership.⁷ Remarkably, cars spend approximately 95% of their lifespan parked, and around the world, cities have dedicated a massive amount of precious urban space to car storage with little consideration of how that space might otherwise be used.⁸ Rising numbers of cars has led to a car-centric development model in which city officials pursue large investments in road networks, highways, and parking facilities, provide free on-street parking, and enact zoning laws that require the construction of off-street parking, often in very high quantities.

The amount drivers pay for on- and off-street parking often does not reflect the real financial or social costs of parking.⁹ When parking is underpriced or available for free, people are given an artificial incentive to drive over other means of transport, expecting to always be able to find a free or low-cost parking space at their destination.¹⁰ When parking prices are kept artificially below what a market would set, demand quickly exceeds supply, and all parking spaces become occupied. This leads to a perceived shortage of parking, which many cities try to address by creating even more low-cost parking.

The abundance of free or low-cost parking also makes walking, cycling, and public transport less attractive.¹¹ This leads to more vehicle-kilometers traveled, which results in congestion as well as air pollution, and other harmful emissions. An oversupply of off-street parking can have other negative consequences too, such as inflating housing costs, inhibiting the change of use of certain buildings, encouraging more car ownership, contributing to urban sprawl, and creating large impervious surfaces that reduce resilience.¹²

However, parking reform is gathering momentum as policymakers and community leaders better understand the benefits of compact cities built around walking, cycling, and public transport. These benefits include better access, reduced need for personal vehicles, cleaner air, and healthier residents.¹³ Although most people do not spend much time thinking about the intricacies of parking policies, these do directly affect social, economic and environmental issues.¹⁴ With car ownership, and thus parking, on the rise globally, it is important that municipalities take a more proactive and holistic approach to parking management.

7 Shoup, Donald. (2019) [Parking Reform Will Save the City.](#)

8 Shoup, Donald. (2017) [The High Cost of Free Parking. Updated edition.](#)

9 ITDP. (2023) [Breaking the Code: Off-Street Parking Reform.](#)

10 ITDP. (2021) [On-Street Parking Pricing.](#)

11 Widiyani, Widiyani. (2020). [The Influences of Public Transport on Parking Space: A Study on Travel Choice Behaviour between Private Cars and Public Transport](#)

12 Gould, Catie. (2022) [Shifting Gears: Why Communities Are Eliminating Off-Street Parking Requirements—and What Comes Next.](#)

13 Ionescu, Diana. (2023) [Parking Reform Gains Momentum](#)

14 Shoup, Donald. (2019) [Parking Reform Will Save the City.](#)

WHAT IS PARKING REFORM?

2

Parking reform aims to align the provision and regulation of space for storing vehicles (on both public streets and private land) with city priorities—namely safety, access, efficiency, equity, and environmental protection. Parking reform encompasses both on-street and off-street parking:

- » **On-street parking**, or “curb parking,” refers to parking on public rights-of-way—usually parallel or angle-in parking along a curb or median—in commercial or residential areas. In many places, this parking is free or priced very low, benefiting a small number of drivers who occupy a large amount of space that could be utilized for other uses, such as cycle lanes, bus lanes, businesses, vendors, or public space.
- » **Off-street parking** refers to private and public parking lots and garages. Many cities require developers to provide a minimum number of off-street parking spaces for different land use types—often referred to as parking minimums. These requirements are often poorly matched to demand, generating an oversupply of parking spaces.



When on-street parking is not priced, turnover is typically low, therefore serving only a few drivers and no one else.
SOURCE: ITDP India

Parking reform is not a war against cars, nor does it seek to remove all parking spaces in cities. Instead, parking reform aims to reduce the negative impacts of driving that affect everyone, especially those who do not drive or own a vehicle. Parking reform can make the entire transportation network function more efficiently, so that trips by walking, cycling, and public transport are encouraged because they are direct and inexpensive, and private vehicle trips are accurately priced to account for their negative impacts. In this way, when private vehicle trips are needed, they are efficient.

Though parking reform will not solve all transport challenges, better parking management is a key lever to create more affordable, reliable transportation options and cleaner, healthier, and more equitable cities for everyone—those who drive and those who do not.

How is parking managed?

Parking has been relatively under-researched and under-emphasized in comparison to other aspects of transportation in cities. **In fact, parking has not been linked to transportation planning in most places.**

The major policies that guide on- and off-street parking—minimum parking requirements for off-street parking and pricing and regulations for on-street parking—are often not conceived of or enacted in alignment with each other.

- » **Minimum off-street parking requirements** are often established in state or local building codes to ensure that parking is available at any destination. In most cities, parking requirements state that each new development must provide a certain minimum amount of off-street parking on-site. However, the amount of parking required is not informed by any real measure of demand nor does it account for the availability of alternative transportation options nearby. Requirements are often the same across many different parts of a city, and often remain the same for decades, despite changes in development, density, etc. Parking minimums are typically set with the goal of meeting or exceeding peak parking demand, even though the existence of parking itself can drive that demand.¹⁵ Because these minimums require the costly construction and maintenance of parking in new developments, they can be unpopular with developers.¹⁶
- » **On-street parking regulations** cover who, when, where, and how long private vehicles may park on a public street. Sometimes referred to as curb management,¹⁷ this can include special parking requirements, such as provision of parking spaces for people with disabilities, freight deliveries, or bus stops, but most notably includes the pricing of curbside parking. Parking pricing plays a crucial role in managing parking demand, alleviating congestion, and encouraging the use of sustainable transport modes. While many cities do set parking fees for at least some commercial or residential on-street parking spaces, these fees are rarely associated with demand or the cost of providing the parking.¹⁸



Competition for curb space means that parking can no longer be the default—other uses such as bicycle lanes, wider sidewalks, and greenery must also be considered.

SOURCE: ITDP India

15 Sightline Institute. (2021). [Verified: More Parking Puts More Cars on the Road.](#)

16 Shoup, Donald. (1999). [The trouble with parking minimum requirements.](#)

17 NACTO. (2017). [Curb Appeal: Curbside Management Strategies for Improving Transit Reliability.](#)

18 Mingardo et al. 2015. [Urban parking policy in Europe: A conceptualization of past and possible future trends](#)

Historically, parking management has followed three phases. In phase 1, parking regulation is seen as a tool to facilitate the use of cars to access key destinations within the central business district. In this first phase, city-managed parking is on-street and free, and regulations (such as time restrictions and parking minimums) are concentrated within the central business district. In the second phase, vehicle use grows. Cities implement reactive policies as demand for parking exceeds supply, and congestion, circling, and illegal parking follow. Limited, ill-conceived, and/or uncoordinated regulation of on- and off-street parking leads to an abundance of parking spaces and an abundance of private vehicles and traffic. Without a vision for how parking should function within the broader transport system, cities attempt to meet demand for parking by requiring that more parking be provided. Eventually, in the third phase, reactionary parking policies are replaced by proactive planning that aims to bring demand into balance with supply and integrate parking into the city’s larger transportation plans.¹⁹

Understanding this trajectory can enable cities to leapfrog the first two reactionary planning phases and focus on proactive parking policies and goals that are aligned with the city that leaders hope to create—one that provides safe, equitable access to destinations and services, minimizes environmental harm, uses resources efficiently, and mitigates negative health impacts. This typically requires the existence of a designated agency or department responsible for the municipal parking picture—both on and off-street—in its entirety.

Who manages parking?

On- and off-street parking are often managed and enforced by different agencies entirely, leading to fragmented implementation, enforcement, and reform. There are typically several actors responsible for different pieces of the municipal parking puzzle. While on-street parking is generally maintained by city parking authorities or transportation departments and enforced by traffic police, off-street parking is often controlled by city planning departments and largely operated by private owners as shown in the table below.

City	On-street parking managing agency	Off-street parking managing agency
Washington, DC	DC Department of Transportation	Regulated by Department of Public Works, owned and operated privately. Some lots operated by the National Park Service.
São Paulo, Brazil	Municipal Department of Mobility and Traffic	Regulated By Municipal Department of Urbanism and Licensing, owned and operated privately
Auckland, New Zealand	Auckland Transport (Regional Transportation Authority)	Public garages: Auckland Transport Private garages: Regulated directly by Auckland City Council via its Unitary Plan
Cape Town, South Africa	Urban Mobility Directorate and Law Enforcement, Traffic, and Coordination Department	Regulated by Development Management Department, largely owned and operated privately
Hong Kong	Transport Department	Regulated by Planning Department, owned and operated privately

Management by different agencies creates coordination and efficiency challenges. If a city agency regulating off-street parking implements parking garage fees while the agency controlling on-street parking does not implement fees or time limits, demand will simply shift to on-street. In this example, it seems that there is not enough parking to meet the demand, when in fact the more expensive off-street spaces are being left unused. Pricing on-street spaces in a way that incentivizes short stays and encourages drivers to use existing off-street lots for longer stays would be a more efficient use of all parking spaces. Thus, successful parking management requires coordinating on- and off-street parking.

What tools can be used to reform parking?

Parking reform is not one-size-fits-all. There are many tools that can be used to ensure that parking is available when needed while not over-incentivizing driving. Some tools, like pricing, impact demand for parking, while others, like removing parking minimums and adopting maximums, impact supply. Together, these tools enable cities to proactively manage parking.

Priced parking is a common tool utilized by local governments to manage demand for parking. Parking fees are often structured per increment of time the vehicle will be parked. Parking pricing can apply to on-street parking, where a driver pays using a parking meter or mobile app, and off-street parking, where drivers pay to park in public garages or lots. Pricing parking can generate environmental, social and economic benefits.²⁰

[See ITDP's On-Street Parking Pricing Guide and SUTP's On-Street Parking Management for more.](#)

Demand-based pricing is a specific form of priced parking in which the cost to park varies depending on the demand for parking at that particular time. This helps to ensure that users are paying the market rate for parking, and that users consider parking cost as a part of their decision to travel, especially at peak times.

[See ITDP's Taming Traffic for more.](#)

Removing parking minimums removes the requirement for new developments to provide a specific amount of on-site parking. Developers can still provide parking, but supply can more closely align with demand based on parking that is already available nearby, proximity to public transport, etc. Removing parking minimums can reduce the costs of new developments and enable developers to dedicate more built area to productive uses such as housing. The removal of minimums ensures that parking supply is responsive to actual demand.

[See ITDP's Breaking the Code: Off-Street Parking Reform Lessons Learned for more.](#)

²⁰ SFMTA. (2014). [SFPark Pilot Project Evaluation](#).



In the Santana neighborhood of São Paulo, Brazil, a few on-street parking spaces were repurposed to daylight a major intersection, improving safety and comfort.
SOURCE: Tomaz Cavallieri, WRI Brasil

Parking maximums are limits on how many parking spaces may be provided on-site for each type of development in a city. Parking maximums enable market-based parking provision up to a set point. This enables cities to control the overall number of parking spaces that can be built. Notably, the impact of adopting parking maximums can vary depending on the existing supply and demand for parking and the level at which maximum limits are set. While there is broad support among parking policy experts for removing parking minimums, there is less consensus around setting maximums. This is because maximums set too high will be largely ineffective, and maximums set too low may have unintended consequences if not carefully coordinated with on-street parking management and other transport policies.

Data collection is an essential tool for properly managing parking. To create policies that accurately reflect parking supply, it is important to know where both on- and off-street parking spaces are located and if/how they are currently priced. Many cities do not have a centralized repository of this data, so they make uninformed guesses about how parking should be regulated, if at all. Collecting and maintaining data on parking can also help reduce pushback to introducing paid parking. For example, the City of Seattle collects parking occupancy data to inform parking rates on an annual basis. When parking rates do change, it is not seen as political because the changes are supported by data.²¹

[See ITDP's Off-Street Parking SCOPE tool to estimate impacts of parking policies.](#)

Myths about parking reform

Parking reform may appear to disadvantage drivers, charging them premium prices to store their personal vehicles. This is a myth. In reality, parking policies simply ensure that supply and demand for parking exist in relation to each other, allowing streets and public spaces to function more efficiently for drivers and nondrivers alike.

²¹ ITDP (2021). [Ideas to Accelerate Parking Reform in the United States](#)

Myth	Reality
<p>Parking policies are an attack on private vehicle owners.</p>	<p>Free and unlimited parking benefits those who can afford to drive. Free on-street parking is a direct public subsidy for that same group, as the government is allocating public space for free for the storage of private property. In many cities in low- and middle income countries most citizens do not drive, instead relying on public transit, walking, or cycling. Smart parking policies help to distribute public space more equitably among different modes of transportation and other land uses. This also benefits drivers as it can reduce congestion and cruising times, and it brings enormous benefits to communities</p>
<p>Implementing parking reforms is expensive and does not bring sufficient benefits.</p>	<p>Parking reform is one of the few transport policies that pays for itself (and, in some cases, other services like bikeshare) by charging fees. For on-street parking, operational costs can be minimized by using technological devices and alternatives that are inexpensive and by implementing the program in stages based on resource availability. Cities can work with concessioned operators to alleviate the costs of direct program management. Eliminating parking minimums costs little to implement; furthermore, it can significantly reduce the costs of new development and retrofitting older structures, providing more opportunities for affordable housing.</p>
<p>Charging for on-street parking will discourage people from visiting local businesses.</p>	<p>Properly priced on-street parking can increase turnover, since customers can more easily find available parking spaces and traffic from double parking and circling is reduced. Even if no space is repurposed, streets with less honking and fewer distracted drivers searching for parking are more attractive for people walking and cycling. Priced parking ensures that parking spaces are used efficiently, benefiting businesses and customers. Repurposing parking spaces for larger sidewalks, bicycle parking, or bus lanes can often bring many more customers to local businesses than the parking spaces they replace. A study from Carlton, Australia found that replacing car parking with bike parking generated five times more revenue for surrounding businesses.²⁴</p>
<p>Reducing the supply of parking spaces will increase congestion from cars cruising for available spaces.</p>	<p>In well-managed parking, on-street spaces are priced according to demand, so drivers take the first available space as opposed to circling for a potentially available free or lower-cost space. Alternatively, drivers seeking longer-term parking may not even consider an on-street space, opting directly for off-street parking, knowing it will be less expensive than paying by time for an on-street space. When fewer parking spaces are available (or parking prices increase) and alternative modes like public transport or cycling are safe and direct, some private vehicle users might rethink driving for every trip, thereby reducing some demand for parking.</p>
<p>Eliminating parking minimums will result in developers losing commercial or residential buyers.</p>	<p>Developers respond to demand; eliminating parking minimums gives them the option to provide parking (and deciding how much) on-site. Developments that are well served by transit can allocate more built space to uses other than parking, significantly reducing the costs of construction and increasing opportunities to retrofit older structures.</p>





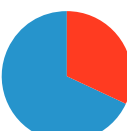
FIGURE 3: The myths and realities of parking reform.

ACTION ITEMS TO IMPROVE PARKING MANAGEMENT

3

As discussed in Section II, parking in cities is typically disconnected from broader transportation planning goals, is managed across different agencies or departments, and is reliant on policies that are not evidence-based or integrated into the broader transportation network. It is important for cities to recognize this and take steps to better integrate parking into transportation and land use planning.

To this end, we recommend four actions to improve how cities approach on- and off-street parking. These actions are informed by case studies for parking management and reform in Zurich, San Francisco, Mexico City, Montreal, and Kigali, summarized in the table below. Full case studies for each city can be found in Section IV.

City	Population	Share of Trips by Car	Year Parking Policy Enacted	Summary
Zurich	428,000	21% (2015) 	1996	By linking on-street and off-street parking supply, and capping the total number of parking spaces, Zurich disincentivized private vehicle use while increasing space for public and non-motorized transportation.
San Francisco	815,000	64% (2021) 	2008	San Francisco leveraged a robust data collection program and showed that effective parking management can help reduce congestion from circling for parking, while also making it easier for drivers to find a parking spot.
Mexico City	9.2 million	22% (2019) 	2012	As car ownership skyrocketed, Mexico City introduced a now well-regarded on-street pricing program and ambitious off-street parking regulations that have resulted in more public space for people.
Montreal	1.7 million	70% (2021) 	2020	Montreal pioneered a new parking agency that positions on- and off-street parking decisions within broader transportation goals and separates parking revenues from the agency's activities.
Kigali	1.2 million	32% (2017) 	2020	Kigali is developing a parking strategy that prioritizes space for the transport modes used by most people—walking, cycling, and public transport.

ACTION 1 | Establish a Coordinated Vision for Parking

Cities should explicitly link parking management with broader goals for transportation, including providing safe, equitable access to destinations and opportunities. Parking should be part of a coordinated vision for managing and prioritizing public space. This means that parking should be accessible for those who need it; however, given its negative impacts, drivers should be charged to use it. Parking should be used as a lever to incentivize sustainable transport options, especially during peak times. Beyond program management costs, revenue from parking fees and fines should support more efficient modes of transport, such as public transportation facilities and pedestrian and cycle infrastructure, to further encourage a shift away from driving and parking.

With a 2016 resolution updating its parking system, **Montreal** identified parking as a key mechanism to achieve its sustainable mobility goals. The city aligned parking with its strategic plans for space management, transportation, and urban development. Montreal has a vision for a fully accessible city for all by 2030 and sees parking policies as a way to improve alternatives to driving and make active travel safer and more comfortable for everyone.²² A commitment to collecting parking data will enable the city to provide real-time multimodal information to travelers so that they can compare accurate costs and lengths for each trip.

Similarly, the **San Francisco** Municipal Transportation Agency (SFMTA) Streets Division houses the city's parking administration, alongside teams focused on bicycle and pedestrian infrastructure provision, street-based capital projects, and long-range planning. Parking is expressly noted as a lever to encourage the use of public transit, walking, and cycling in SFMTA's Transit-First Policy, which governs the agency's decision-making: "Parking policies for areas well served by public transit shall be designed to encourage travel by public transit and alternative transportation."²³



In Mexico City, on-street parking, cycling, bikeshare, and urban freight are overseen by the same agency, allowing for a coordinated strategy at the curb.

SOURCE: quigg4 via Shutterstock

Mexico City's Ecoparq is overseen by SEMOVI, the agency responsible for cycling and bikeshare, as well as urban cargo transport. The Ecoparq program operates under six key objectives, including reducing the use of private cars within Ecoparq zones, improving travel for all by reducing parking search times and related pollutants emitted, promoting more efficient use of urban space, and redistributing the social cost of land used for parking.²⁴

²² Agence de Mobilité Durable de Montreal. (n.d.) [Mission, Vision, Values](#).

²³ https://codelibrary.amlegal.com/codes/san_francisco/latest/sf_charter/0-0-0-785

²⁴ <https://www.ecoparq.cdmx.gob.mx/dependencia/acerca-de>

ACTION 2 | Manage On- and Off-Street Parking Together

To maximize the benefits of parking management, on- and off-street parking should be managed together, as part of broader urban transportation planning and management. If only one type of parking is managed while the other remains uncontrolled or underpriced, demand will simply shift towards the cheaper, less restricted option. Similarly, if parking management is disconnected from city and transportation planning, parking policies may not align with or may even hinder other transport planning and management efforts (see Action 1).

One way to improve coordination between on- and off-street parking is to bring authority for both into the same agency or department, as was done in **Montreal**. Their consolidated parking agency is responsible for identifying targets that are linked to broader citywide goals and/or align with broader transportation and land use plans. When staff can focus on a city's entire parking landscape, they are also better positioned to pursue more complicated questions or plans related to parking, such as curb management or public electric vehicle charging.



Montreal's parking agency manages and prioritizes public space in addition to regulating parking. **SOURCE:** Ronald Ehrl via Flickr

Zurich took a unique approach to institutionalizing parking by tying on- and off-street parking together within a system of equilibrium, where adding off-street spaces required removing on-street spaces. This integrated vision, which capped parking at 1990 levels, has been a key part of the city's ability to increase ridership of public transport and cycling and to reduce rates of daily car use.

While **Kigali** is still developing its parking strategy, the city is already thinking about the role of institutionalization. Consolidating authority into a streamlined parking unit that would oversee the entire parking system will be a critical step toward implementing an advanced, IT-based enforcement system—a critical piece of any successful parking program.

Rethinking Parking

How to create less parking and more city

Parking policies in cities aren't just about storing vehicles. They inform how street space is prioritized and who street space is ultimately for. Rethinking parking can shift streets for cars to streets for people - but how?



PRICE ON-STREET PARKING



- ▼ Less congestion
- ▲ Increased municipal revenue
- ▲ Street space prioritized
- ▲ More parklets and outdoor dining space

ELIMINATE OFF-STREET PARKING MINIMUMS



- ▲ More active streetscapes
- ▲ More green space
- ▲ More affordable housing

CITIES THAT RETHINK PARKING

Create more equitable and sustainable urban environments that make room for all forms of mobility.



ACTION 3 | Understand your Parking Picture Through Data

Cities must understand where and how on- and off-street parking spaces are being used. This is critical to inform policies such as pricing on-street parking or removing or reducing off-street parking minimums near transit stations. Your city’s parking picture can be understood by using a range of technologies and data-collection approaches that fit different budgets and technical capabilities. What is important is the ability to make evidence-based decisions about parking provision and curb use, and to be transparent about where and why those decisions are being made.

The **San Francisco** case study provides an interesting approach to data collection: conducting a “parking census.” With funding from a federal grant program, San Francisco used funding from a federal grant program to conduct its parking census by combining existing documentation and field data into one geographic information system (GIS) file—a complete dataset of all parking in the city. The city was then able to use this dataset to make decisions throughout the implementation of its demand-based pricing pilot, SFPark, as well as to share up-to-date parking information with the public.

The parking census approach can also be carried out with a more limited budget by slowly implementing it by neighborhood or only collecting data on parking supply. The **City of Kigali** completed an inventory of its on- and off-street parking by reviewing planning documents and coming up with a standard methodology to approximate available spaces on each street. The city also conducted site visits to off-street parking facilities and counted the number of spaces. Taken together, these datasets provide an approximate but comprehensive parking picture.



Understanding the location and use of on- and off-street parking spaces is critical to setting data-driven parking policies.

SOURCE: Jennifer Sophie via Shutterstock

Alternatively, **Montreal** collects data on parking through its mobile app and uses the app to deliver parking information to users. The city also conducted a survey of off-street parking lots which showed a surplus of off-street spaces that the city is now considering as sites for future mobility hubs. Data collection is also playing a role in the city’s digital inventory of its curb space to better understand demand and opportunities for different uses at the curb.

How cities use and publish the data they collect is also important. In **Zurich**, data collection is critical to maintaining the equilibrium between on- and off-street parking that underpins the city’s “parking compromise.” The city also maintains transparency by making its public off-street parking data available through its open data portal every two years.²⁵

In **Mexico City**, data showing that parking was the single largest land use in new buildings helped make the case for the city to revisit its off-street parking requirements. Linking data to a narrative about what that space could otherwise be used for led to the replacement of parking minimums with maximums, which resulted in a 10-percentage-point reduction in built area designated for parking.

ACTION 4 | Carefully Structure Funding and Revenue Flows for Parking

Most cities fund parking management using revenues generated from parking fees as well as municipal tax revenue. A key strength of priced-parking programs is that they can generate significant revenues to offset the costs of implementing and running the program—and even support other transport projects (for example, on-street parking revenues in Fortaleza, Brazil support the city’s bikeshare program and cycle infrastructure implementation).

However, the goal of managing parking should not be *solely* to generate revenue but also to improve the use of public space. An over-reliance on parking revenues can make it challenging to remove revenue-generating spaces in the high-demand areas where more efficient uses of public space (e.g. expanded sidewalks, bicycle lanes, and bus lanes) are most needed. Integrating parking into broader transportation planning and decision-making can help to reduce this type of siloed revenue generation and application.

Montreal’s Agence Mobilité Durable receives its funding from the city’s capital budget rather than from allocating parking revenues directly to the parking agency. This separates revenue generated from the parking program from the agency’s decision-making, which enables the agency to focus on its vision for parking to support mobility. Disconnecting the agency’s activity from the revenue it generates allows the agency to make decisions that are influenced by the needs of residents and the goals of the city. This independence enables the agency to make decisions that are more equitable, making space for people instead of cars.



The Masson mobility hub in Montréal provides access to a number of mobility services, reduce heat islands and improve safety for users of the parking lot. **SOURCE:** Agence de Mobilité Durable de Montréal

25 European data. (n.d.). [Publicly accessible car parks.](#)

Cities should be careful not to fund long-term programs solely with parking revenues, as the goal is to reduce fines (for noncompliance) and the number of paid spaces provided (if appropriate) over time, which could yield lower revenues. A mix of funding sources would reduce incentives to maintain parking spaces and maximize fees and fines. In some cases, national or subnational funding may be available to support parking programs, though this is typically not a sustained source of funding. This was the case in **San Francisco**, where federal grant funding was used to implement its SFPark on-street parking program as well as an off-street parking information system. The grant also included funding for several parking technologies to support the program.

CASE STUDIES

4

Case studies were selected across a variety of geographies and timelines to evaluate different approaches and impacts of parking reform. There are relatively few examples of cities proactively managing on and off-street parking together, so it is important to document the cases that do exist to draw lessons that can be replicated elsewhere. While some of these interventions were implemented years ago, others are more recent. We have included impacts where available, but some programs are still in early stages and will take time before the full impacts are realized.

Zurich, Switzerland

Population	Share of Trips by Car	Year Parking Policy Enacted	Summary
428,000	21% (2015)	1996	By linking on-street and off-street parking supply, and capping total parking spaces, Zurich has disincentivized private vehicle use while increasing space for public and nonmotorized transportation.



SOURCE: Jorge Franganillo via Flickr

Parking reform in Zurich began in the 1960s with the implementation of parking meters on city streets. While this started as a small number of parking-enforced areas in the city center, it has since evolved into a large-scale system intended to increase parking turnover rates. The city's parking spaces are split into two zones: blue and white. Blue zones have a variety of time limits but generally allow for a certain amount of free parking with a European parking disc,²⁶ while white zones require visitor payment that increases the longer the car is parked.²⁷

The city's civil engineering department, *Tiefbauamt der Stadt Zürich*, has aimed to shift on-street parking to private off-street spaces so that it can repurpose public space for higher-value uses. In 1996, Zurich passed a historic parking compromise: Quite literally referred to as *Der Historische Kompromiss von 1996*, the referendum ruled that parking in the city would be capped at 1990 levels.²⁸ Notably, the relationship between on- and off-street parking was front and center: For every off-street parking space added

²⁶ Parking discs are a common tool used to provide time-restricted free parking in Europe. The disc is able to display a variety of times, and should be set to the next half hour after the user arrives. The vehicle is then able to remain parked for free for 2 hours after the displayed time.

²⁷ ITDP. (2011). [Europe's Parking U-Turn: From Accommodation to Regulation](#).

²⁸ Stadt Zürich Tiefbauamt. (2009). [Der Historische Kompromiss von 1996. Erläuterungen zu Entstehung und Umsetzung](#).

in the capped area, an on-street space would have to be removed to maintain the “compromise.” The removal of on-street spaces would allow public space to be redeveloped or reallocated from parking to other uses, such as public plazas.²⁹

The popularity of this system was affirmed in 2010, when Zurich residents voted to maintain strict parking maximums. Capped zones were expanded to cover the whole city and caps were lowered in regions well-served by public transit.³⁰ While total parking stayed about the same, on-street parking supply decreased, while off-street parking grew, as shown in the graph below. In recent years, the space freed up by a significant reduction in on-street spaces has been prioritized for bicycle lanes.³¹

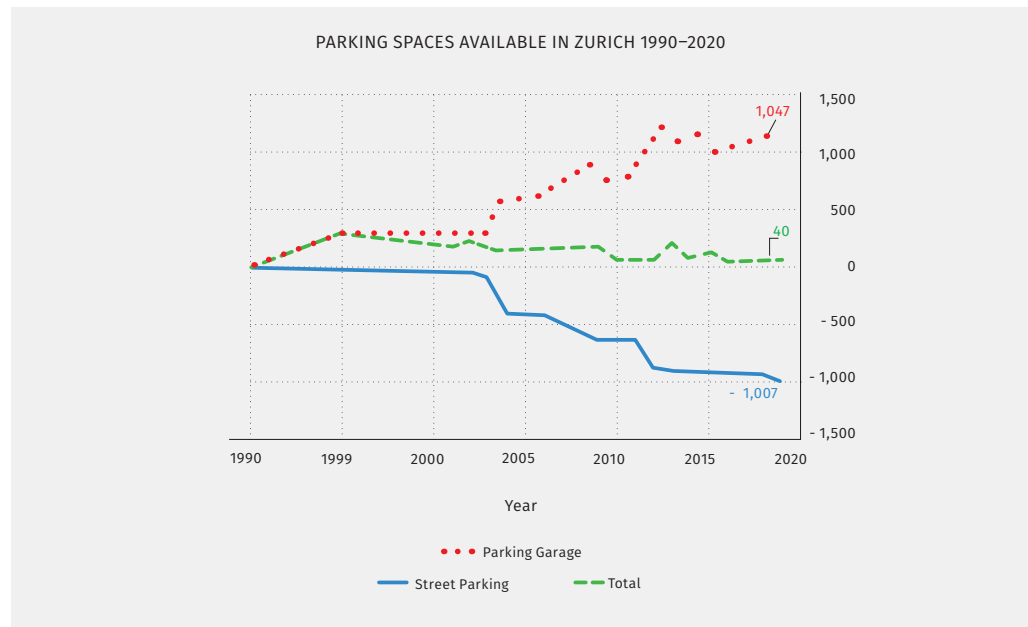


FIGURE 4. Change in parking space allocation in Zurich
SOURCE. [Parking Standards as a Steering Instrument in Urban and Mobility Planning](#)

Alongside other policies to reduce demand for driving, Zurich’s commitment to integrating parking management into its transportation planning has contributed to a declining modal share for private vehicles and growing modal shares for public transport and cycling between 2000 and 2015. Trips by private vehicles dropped from 40% to 25% over that 15-year period, and public transport and cycling trips grew by 10 and 4 percentage points, respectively. This 25% vehicle mode share is low compared to peer European cities such as Vienna (27% vehicle mode share in 2015) and Copenhagen (33% vehicle mode share in 2014). Zurich set a goal of only 20% of trips made by private vehicle by 2020.³² In 2021, only 7% of Zurich residents reported using a car every day, while 53% of residents reported never or infrequently using one.³³ While the city’s population has continued to grow, mobility-related CO₂ emissions and traffic volumes have both decreased—the opposite of what has been observed at the national level in Switzerland.³⁴

Zurich’s approach to parking policy has been critical to the success of the city’s public transportation system. By maintaining parking supply at 1990 levels, the 1996 compromise effectively nudged commuters toward public transportation, both by limiting on-street parking and improving transit service (dedicated lanes, increasing access by bicycle, etc.).³⁵ The city continues to tighten parking regulations as a means of discouraging private vehicle use, especially by commuters.³⁶

29 ITDP. (2011). [Europe’s Parking U-Turn: From Accommodation to Regulation.](#)

30 Garrick, Norman & McCahill, Christopher. (2012). [Lessons from Zurich’s parking revolution.](#)

31 Willi, Erich. (2018). [Parkraumplanung im Zeichen der Verdichtung.](#)

32 Wimmer, Rupert. (2019). [Parking planning and policies in Zurich.](#)

33 City of Zurich. (2021). [Population Survey 2021.](#)

34 Menendez, Monica & Ambühl, Lukas. (2022). [Implementing Design and Operational Measures for Sustainable Mobility: Lessons from Zurich](#)

35 Mineta, Norman. (2001). [Implementation of Zürich’s Transit Priority Program](#)

36 Menendez, Monica & Ambühl, Lukas. (2022). [Implementing Design and Operational Measures for Sustainable Mobility: Lessons from Zurich](#)

Zurich is an early example of the impacts of parking reform, and it provides a longer-term perspective on how parking policies can be implemented and strengthened. Over time, the strong link established between parking and public transportation and livable spaces has contributed to a city that is less dependent on private vehicles and supportive of continued efforts to prioritize people over parking.

San Francisco

Population	Share of Trips by Car	Year Parking Policy Enacted	Summary
815,000	64% (2021)	2008	San Francisco has leveraged a robust data-collection program and shown that effective parking management can help reduce congestion from circling for parking while also making it easier for drivers to find a parking spot.



SOURCE: Justin Ennis via Flickr

While many cities face difficulties because of a disconnect between on and off-street parking management, San Francisco provides clear insight into the benefits that can come from a central agency that controls both. The San Francisco Municipal Transportation Agency (SFMTA) can maintain this unique role because it originated from a ballot measure that was set to combine control of public transportation with parking and traffic management.³⁷ This consolidated agency allows the city to work toward its goal of being transit first, pursued in part through effective management of public on- and off-street parking.³⁸

In 2008, the SFPark pilot project was approved (and it was later implemented as a long-term program), aiming to make it easier for residents to find a parking space by managing demand. Actions taken through the pilot program included demand-responsive pricing—where parking rates fluctuate based on time of day and demand over time—as well as lengthening or entirely removing time limits. On the whole, these changes allowed the city to more effectively control parking demand. They also made it easier for drivers to find a parking spot, reduced congestion, and increased parking revenue by

37 SFMTA. (n.d.). [About the SFMTA](#).
 38 SFMTA . (n.d.). [Transit-First Policy | SFMTA](#)

\$1.9 million per year (while decreasing hourly meter rates by 4%).³⁹ Vehicle-miles traveled and associated greenhouse gas emissions from searching for parking decreased by 30%, and double parking was reduced by 22% within the pilot area. Bus speeds also increased slightly within the pilot area.⁴⁰

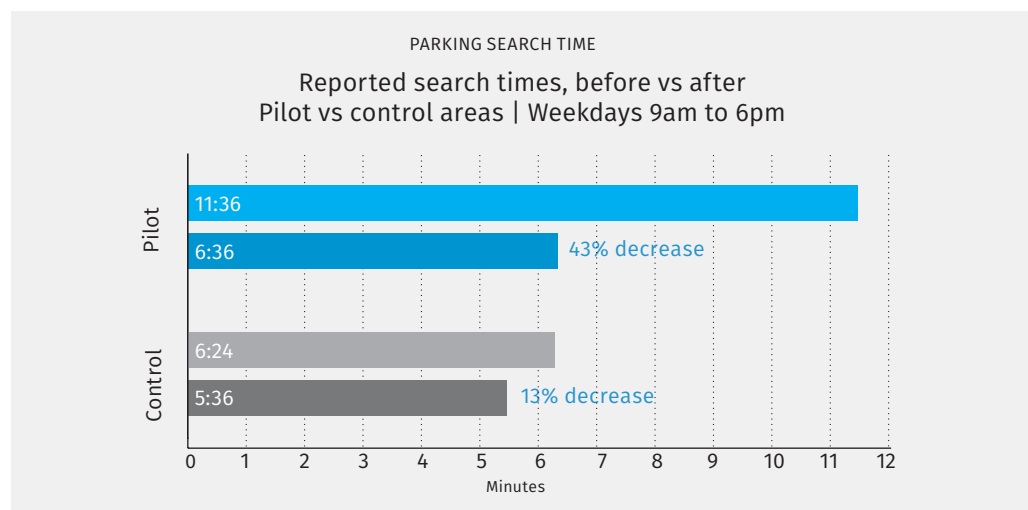


FIGURE 5: Change in parking search times in the SFPark pilot area
SOURCE: [SFPark Pilot Project Evaluation](#)

The SFPark pilot program was funded largely through the United States Federal Highway Administration’s Urban Partnership Program, which provided grants to localities in order to reduce congestion. The grant provided \$19.8 million in funding for the variable parking pricing project.⁴¹ The SFPark program was designed to reduce overall vehicle-miles traveled and double parking, both of which would ultimately reduce congestion in the pilot area. Parking technologies such as networked parking meters, occupancy sensors, and information systems were purchased via the grant. Providing accurate information about parking availability to drivers before their trip was another strategy to reduce congestion, with the aim of nudging drivers to take trips at off-peak times when parking may be more readily available. A system to display parking availability on the SFMTA website and sent via text to drivers, as well as dynamic message signs outside of city-operated off-street garages (to reduce circling) were also purchased with the grant.

While the SFPark pilot was being fully implemented, the city also made another major change to its parking system. In January 2019, an ordinance went into effect that removed all off-street parking minimums throughout San Francisco.⁴² This means that developers building or renovating buildings in the city were no longer beholden to provide a certain number of parking spaces depending on the type and size of the building. While this would not lead to an outright decrease in total parking spaces in the city, it would allow for new growth without also creating more parking, which is a known contributor to increased congestion and car use. This change came at a time where many other US cities (Buffalo, New York; Minneapolis, Minnesota; San Jose, California; Raleigh, North Carolina) were also removing minimum parking requirements, indicating a groundswell of support for rethinking the link between parking and traffic management in urban areas.⁴³

On the whole, the success of parking reform in San Francisco has been due to a unified front that has been upheld by SFMTA and made possible by its management of both on- and off-street parking. The collection and maintenance of extensive datasets was also a central feature of the project. This included a census of all parking in the city, along with sensors to detect occupancy rates and all new parking meters. Part of the magnitude of the project was because its

39 SFMTA. (2014). [SFPark Pilot Project Evaluation](#).

40 SFMTA. (2014). [SFPark Pilot Project Evaluation](#).

41 Battelle Memorial Institute. (2009). [San Francisco Urban Partnership Agreement National Evaluation Plan](#)

42 San Francisco Board of Supervisors. (2018). [Meeting Minutes - San Francisco](#).

43 Ferrin, Robert. (2023). [As More Cities Eliminate Parking Minimums, What Happens Next?](#)

intended goal was to collect data to report after the pilot was completed, though implementation in another city would likely still require a substantial budget to determine demand-based parking rates. While San Francisco’s funding was sourced primarily from a federal grant, a re-creation of this program may be funded through alternative sources.

Mexico City

Population	Share of Trips by car	Year Parking Policy Enacted	Summary
9.2 million	22% (2019)	2012	As car ownership skyrocketed, Mexico City introduced a now well-regarded on-street pricing program and ambitious off-street parking regulations that have resulted in more public space for people.



SOURCE: Alejandro De La Cruz via Flickr

As the 2000s came to a close, Mexico City knew it was at an impasse. Car ownership had nearly doubled in the previous decade, increasing congestion, pollution, and traffic deaths. The largely unregulated world of parking in Mexico City served as a major opportunity for improving the city’s transportation network. Historically, on-street parking was free or informally controlled, leading to long circling times and general dissatisfaction with the system. Occupancy rates in some neighborhoods would exceed 100% because of double-parking and illegal parking on sidewalks and crosswalks and in parking garages.

Mexico City opted to pursue parking reforms by pricing on-street parking. In 2012, the pilot version of EcoParq, a sophisticated multispace parking meter system, was introduced to tackle the many issues that plagued on-street parking in the city. In the pilot neighborhood of Polanco, the implementation of paid parking produced almost immediate benefits—average cruising times went down 10 minutes, occupancy rates went down by almost 40%, and the system raised approximately 70 million pesos for the parking authority as well as public works projects.⁴⁴ Decreased cruising times also led to an estimated savings of 18,000 tons of carbon emissions per year, equivalent to the annual emissions of nearly 3,000 Mexican residents⁴⁵

44 ITDP. (2013). [Impacts of the ecoParq program in Polanco.](#)

45 OECD. (2021). [Mexico: progress in the net zero transition.](#)

While this system could still be improved (demand-responsive pricing would be a major asset for further controlling occupancy rates), the introduction of EcoParq has been deeply successful as a tool to manage on-street parking in the city. Part of this success has to do with the system’s ability to consolidate a variety of different parking operators under the EcoParq brand, creating a sense of trust and understanding among Mexico City residents. Additionally, the Ministry of Mobility allocates 30% of revenues from EcoParq back to the communities it serves to support streetscape improvement projects.⁴⁶

To complement the on-street parking pricing program, Mexico City also introduced off-street parking reforms in 2017.⁴⁷ These reforms, which included replacing parking minimums with maximums, were informed by an ITDP report that found that existing parking policies encouraged car use and that parking was the highest single land use in new buildings built between 2009 and 2013.⁴⁸

In an effort to shift how parking was impacting built space in the city, the reforms also required developers who implement parking in the city center that is more than 50% of the maximum to pay additional fees to be used by the city for improvements to public transport and streetscapes. Mexico City’s off-street parking reforms informed other cities in Mexico as they reviewed their building and zoning codes to better reflect actual parking demand. For example, in 2022, the municipality of San Pedro Garza García reviewed its zoning code and replaced minimum parking standards with parking maximums. A 2020 review of the 2017 parking reforms shows that large developments reduced the built area designated to parking from 42% to 33% because of the conversion of parking minimums to maximums, meaning more useful living or retail space.⁴⁹

Montreal, Canada

Population	Share of Trips by Car	Year Parking Policy Enacted	Summary
1.7 million	70% (2021)	2020	Montreal pioneered a new parking agency that positions on- and off-street parking decisions within broader transportation goals and separates parking revenues from the agency’s activities.



SOURCE: Andriy Blokhin via Shutterstock

46 ITDP. (2021) [On-Street Parking Pricing](#).

47 Schmitt, Angie. (2017). [It’s Official: Mexico City Eliminates Mandatory Parking Minimums — Streetsblog USA](#)

48 ITDP. (2020) [Más Ciudad, Menos Cajones – Evaluación de impacto del cambio a los requerimientos de estacionamiento en la Ciudad de México y recomendaciones de política pública.](#)

49 ITDP. (2020) [Más Ciudad, Menos Cajones – Evaluación de impacto del cambio a los requerimientos de estacionamiento en la Ciudad de México y recomendaciones de política pública.](#)

Beginning in 1995, all parking in Montreal was controlled through an agreement with the Chamber of Commerce of Metropolitan Montreal, which created a limited partnership corporation known as Stationnement de Montréal. The corporation was responsible for on- and off-street parking, which was largely seen as an opportunity to generate revenue for the city. Meanwhile, parking enforcement fell under the purview of the police department, as a relatively low priority. While this approach is common, Montreal started to see a disconnect between parking management and the city's evolving urban development and transport goals.

As such, in 2016 the city council unilaterally passed a resolution stating that the city should create a dedicated parking agency.⁵⁰ With this new agency, parking would become an essential lever for Montreal to achieve its sustainable mobility goals. The agency would help to align parking with the city's strategic plans for transportation and urban development.

The result of this parking mandate was the formation of the *Agence Mobilité Durable* (AMD), a paramunicipal organization that began formal operations at the cessation of the 25-year Chamber of Commerce agreement in 2020. AMD does not operate directly under the city government, but unlike a typical parking authority, AMD does not keep the revenues generated from the parking program—these are remitted to the city. This organizational structure means that funding of Montreal's parking projects happens independently from the revenue those projects produce. Under the AMD, parking enforcement is no longer under the jurisdiction of the police department, instead being moved under AMD.⁵¹

AMD's unique structure and responsibility for many aspects related to curb space has allowed for strong innovation within Montreal's parking strategy, even expanding the concept of what the remit of a "parking agency" is. As the agency has grown, it has evolved from managing parking to managing space. This includes curbside management, such as taxi stands and drop-off zones for various uses, and the agency is conducting a digital inventory of its curbspace to support these efforts. AMD is also planning to collect and leverage parking data to maximize the usability of its parking mobile app and provide users with real-time information about parking availability and alternate modes for their trip. AMD aims to implement 150 mobility hubs across the city over the next 25 years, which the agency views as opportunities to optimize use of off-street parking facilities, especially in neighborhoods where transportation solutions are scarcer. These hubs would centralize several different mobility offerings, such as electric vehicle charging, bikeshare, car share, and even benefits such as package lockers, greening and stormwater elements.⁵²

50 de la Chevrotière, Charles and Séguin, Mathieu. Personal Interview. Jan 23, 2024.

51 de la Chevrotière, Charles and Séguin, Mathieu. Personal Interview. Jan 23, 2024.

52 de la Chevrotière, Charles and Séguin, Mathieu. Personal Interview. Jan 23, 2024.

Kigali, Rwanda

Population	Share of Trips by Private Vehicle	Year Parking Policy Enacted	Summary
1.2 million	32% (2017)	2020	Kigali is developing a parking strategy that prioritizes space for transport modes used by most people—walking, cycling, and public transport.



SOURCE: Commonwealth Secretariat via Flickr

Most trips in Kigali, Rwanda are made by walking or cycling (52%); motor vehicles (cars and two-wheelers) account for approximately one in three trips. The Master Plan for Kigali, adopted in 2020 and running through 2050, calls for a city-wide parking strategy that reduces demand for private vehicles and promotes the modes most often used by residents: walking, cycling, and public transportation. For example, the plan asserts that on-street parking facilities will only be provided once walking and cycling infrastructure is made available, and it will not be permitted along BRT corridors or on arterial streets.⁵³

Currently, three main organizations oversee parking provision, management, and enforcement: the City of Kigali, Millennium Savings and Investment Cooperative (MISIC, which provides parking management and security services for governments and private clients), and the Traffic Police. Together, these organizations are working to transform Kigali's parking system so that it is more closely aligned with the Master Plan. Defining on-street parking areas, producing signage, and setting parking fees and fines for non-payment are responsibilities of the City; MISIC collects parking fees and fines in regulated areas; and the Traffic Police set and collect fines for parking in no-parking areas. Notably, a portion of on-street parking fees and fines has been allocated to support a community-based health insurance scheme. Off-street parking minimums have been defined by the Master Plan; however the City has the authority to make exceptions to the minimums, such as eliminating parking minimums for developments within 500m of a BRT corridor. MISIC operates some off-street parking lots.

To achieve the outlined goals relating to parking management, the City of Kigali completed a parking inventory of its on- and off-street parking. It was

53

Surbana Jurong Consultants. (2020). [Kigali Master Plan 2050](#).

able to estimate total on-street parking spaces by measuring each side of a block, subtracting any no-parking zones (driveways, intersections, bus stops, etc.), and then dividing by the length of a standard parallel parking space. The City of Kigali conducted site visits to all off-street parking facilities and counted the number of spaces. This allowed the city to determine the approximate maximum capacity of all city parking infrastructure, opening the door for future implementation of demand-based pricing or other parking management strategies.

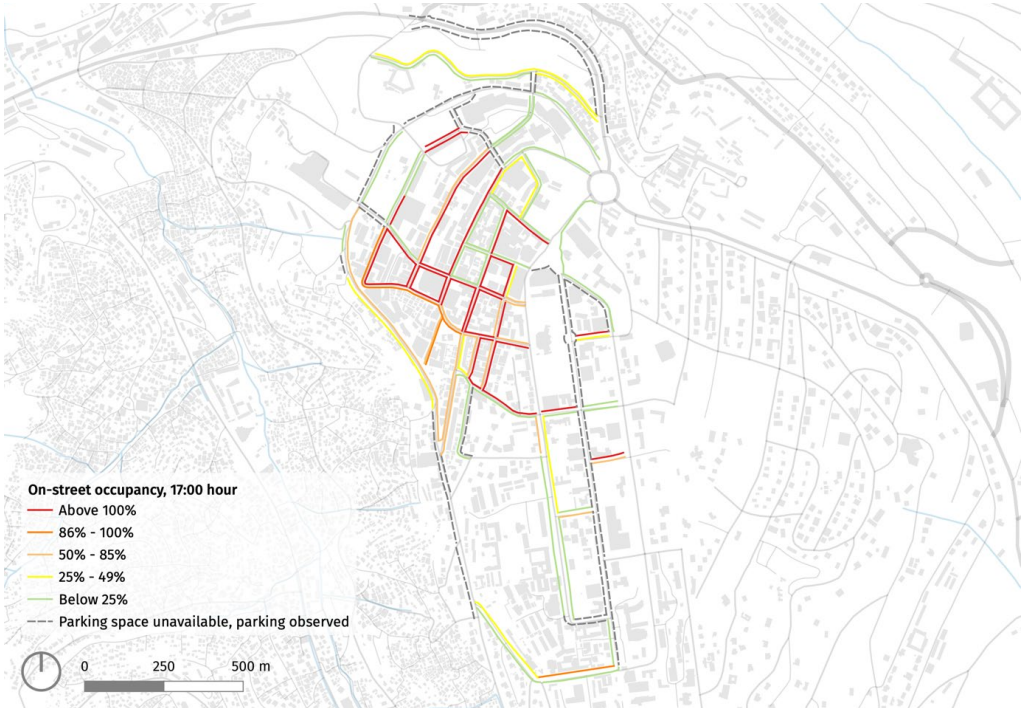


FIGURE 6: Observed on-street parking occupancy at peak hour in Kigali, Rwanda CBD
SOURCE: ITDP Africa data

A comparison of on- and off-street parking fees shows a stark difference between the two. Set by presidential order, on-street parking is RWF 100 (0.08 USD) per hour and cannot exceed RWF 500 (0.40 USD) even if a vehicle is parked for more than five hours (a one-way bus trip is about RWF 100–300). Off-street parking prices, however, increase over time, reaching RWF 15,000 (11.70 USD) after 10 hours. This indicates that on-street parking is priced below market rate and may be disproportionately sought after, even for longer-term parking which is more suited for off-street locations.

Kigali is currently developing its parking strategy, which includes defining system goals, revising hourly parking rates, identifying opportunities to improve enforcement, and evaluating institutional and policy modifications needed to ensure effective implementation. The city is considering creating a parking unit that would consolidate authority and monitor operations across the parking system. It would take over responsibility for collecting parking fees and fines, and working to minimize the oversupply of off-street parking. This would help the city as it pursues an IT-based enforcement system, which will require coordination between the city parking unit (to establish clear parking and no-parking areas and a process for issuing fines, as well as key performance indicators to be tracked over time), the technology provider, and the Traffic Police carrying out enforcement.

CONTACT



**INSTITUTE FOR
TRANSPORTATION
& DEVELOPMENT POLICY**

9 East 19th Street, 7th Floor
New York, NY 10003 USA

T: + 1-212-629-8001

E: mobility@itdp.org

W: www.itdp.org

