



ITDP



British Embassy
Mexico City



Impacts of the ecoParq program on Polanco

Preliminary overview of the parking meter system
after one year running

Andrés Sañudo, Xavier Treviño, Jimena Veloz and Salvador Medina.

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The final report was prepared by Andrés Sañudo Gavaldón, Xavier Treviño Theesz, Jimena Veloz and Salvador Medina.

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Acronyms and abbreviations

- AEP.** A Public Space Authority of Mexico City, Federal District.
DMH. Miguel Hidalgo District.
ITDP. Institute for Transportation and Development Policy.
RTP. Passenger Transport Network, Mexico City, Federal District.
SEDUVI. Department of Urban Housing and Development, Mexico City, Federal District.
SSP. Department of Public Security of Mexico City, Federal District.
ZMVM. Metropolitan Area of the Valley of Mexico.

Units

- h.** Hour or hours.
kgCO₂. Kilograms of carbon dioxide.
kgCO₂/l. Kilograms of carbon dioxide per liter.
km. Kilometers.
km/h. Kilometers per hour.
km/l. Kilometers per liter.
KVR. Vehicle- kilometers traveled.

Chemical compounds

- CO₂.** Carbon dioxide.

1. Introduction

A year after parking meters were implemented in Polanco (completed in January 2012), ITDP Mexico has evaluated the impact of this program on the neighborhood. It is important to note that our review is preliminary and is based on partial information with respect to several issues. For this reason, more data is necessary before we can extensively evaluate the effects of the program.

Prior to system implementation, ITDP Mexico conducted a Baseline Study of the Implementation of parking meters in the Polanco neighborhood of Mexico City (Sañudo, 2012). Data was compiled on the pre-meter situation to build a better foundation for post-implementation assessment. The preliminary results of this report are based on this study and should be complimented by further analysis by government agencies in the coming months.



Photo: Aarón Borrás

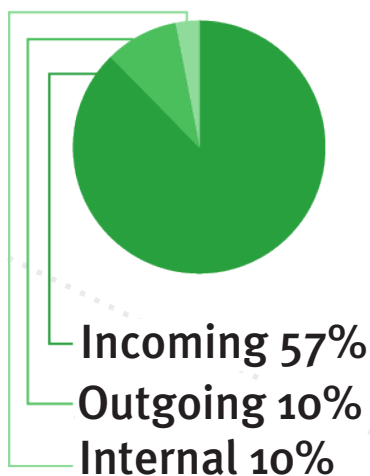
2. The parking problem before the implementation of parking meters¹

For many years, the Polanco neighborhood of Mexico City has generated a high number of trips as a result of its proximity to the Reforma and Insurgentes corridors. In 2010, Polanco had 30,874 inhabitants and received 181,543 daily trips (DMH, 2011). 49% of this volume - or 88,504 trips - were made by private car. Compared to the 20% average for the Metropolitan Area of the Valley of Mexico as a whole, this figure reflects a relatively high volume of car use. Of these trips, 67% of the cars are occupied by a single passenger.

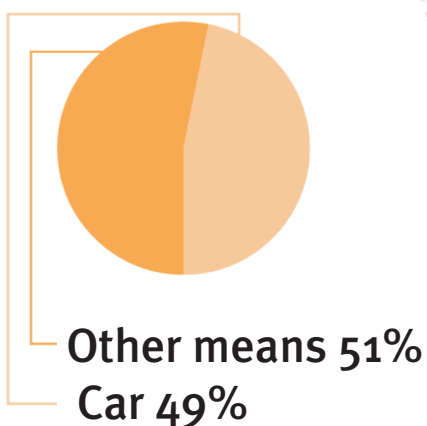
Also, 60,182 of the daily trips to Polanco are for work-related reasons (long stay) and 28,321 are of short duration. The fact that most of the trips are of long duration resulted in a low turnover rate: 57.1% of the parking spaces were used by the same vehicle for longer than 6 hours.

CHART 1: DISTRIBUTION OF TRIPS TO POLANCO (percentage)

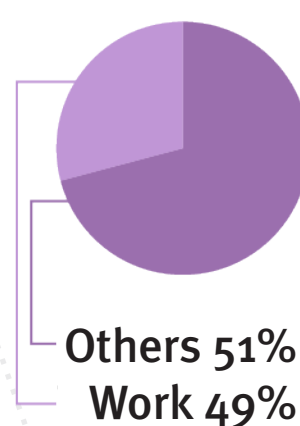
Polanco Trips



Automobile Use



Reason of travel

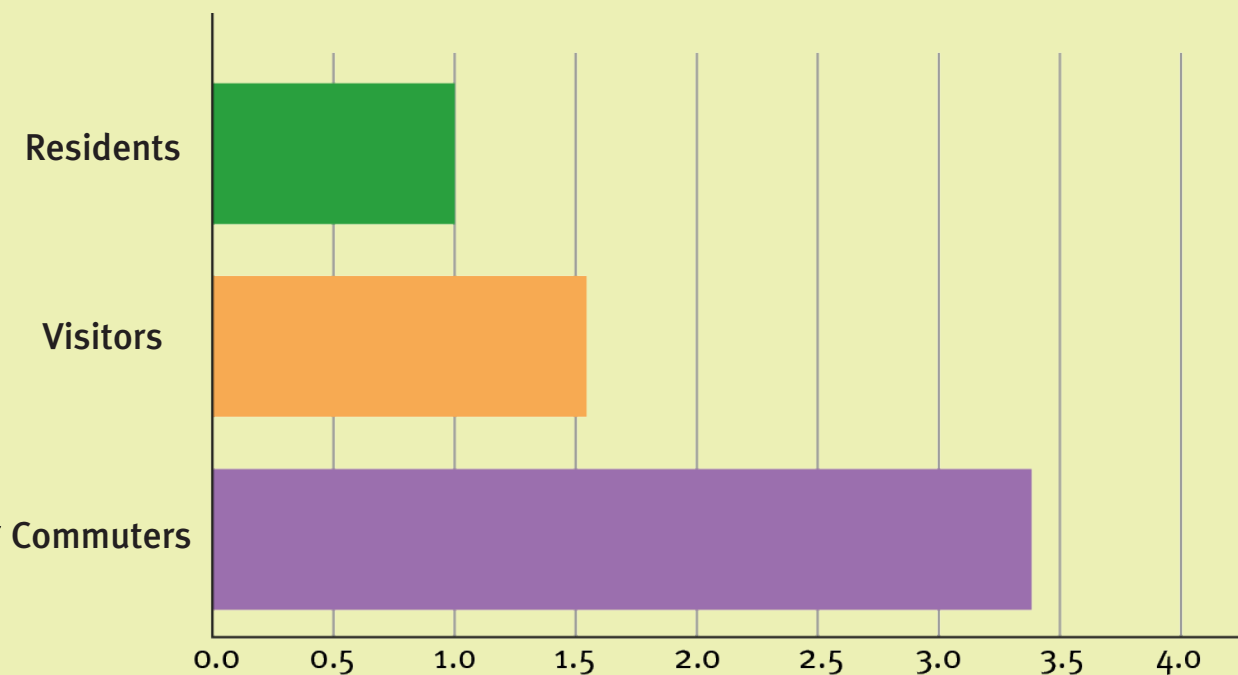


Source: Sañudo, 2012.

There are 9,271 on-street parking spaces in Polanco plus an additional 304 occupied by taxis and 476 spaces reserved for embassies, consulates and educational institutions. In total, there are 10,051 on-street parking spaces. Based on the Mobility Potential in Polanco Study of the Miguel Hidalgo District (DMH, 2011), an additional 10,418 parking spaces exist in 63 off-street parking facilities. That is to say, the neighborhood's total supply of publicly accesible parking is 19,689 spaces.

Approximately 85% of Polanco households own a car; with an average of 1.34 cars per household (INEGI, 2010); resulting in slightly over 18,000 cars belonging to neighborhood residents. In total, there is a ratio of 5 visitors per resident of which 3.4 are daily commuters and 1.6 are short-term visitors.

CHART 2: RELATION OF A POLANCO RESIDENT VS. VISITORS AND WORKERS, 2010

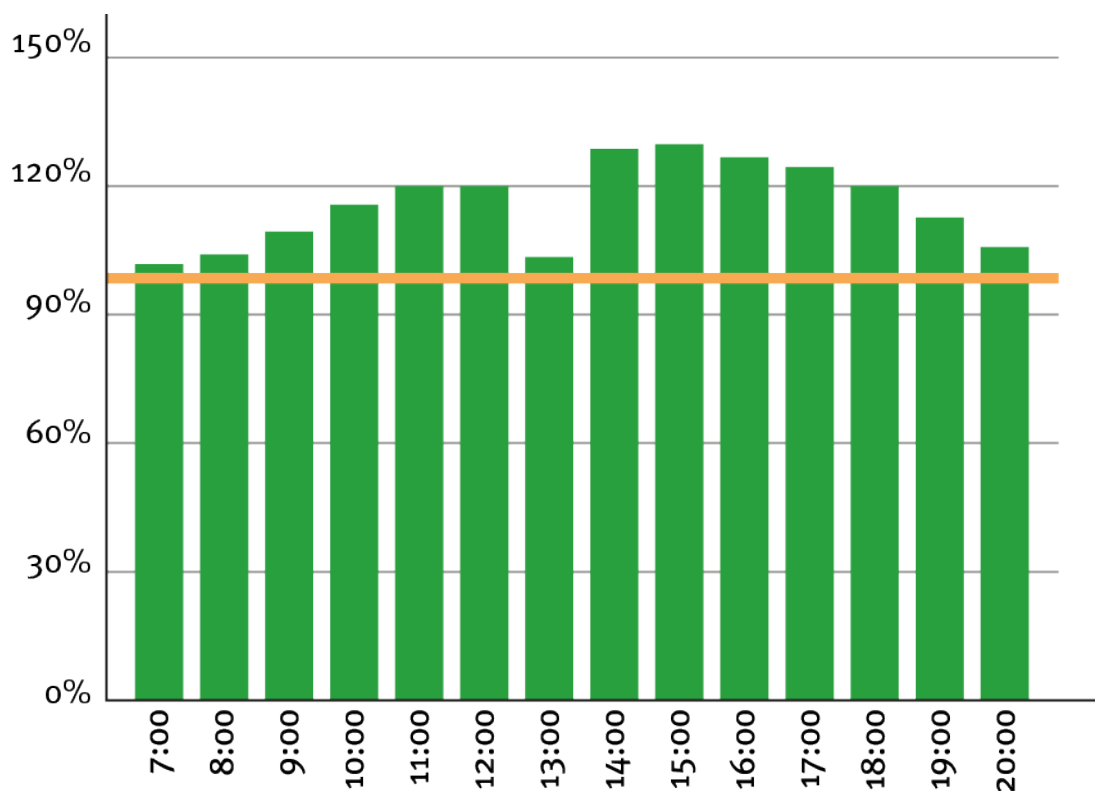


Source: Sañudo, 2012.

3. Occupancy: Greater availability of parking spaces for residents and visitors

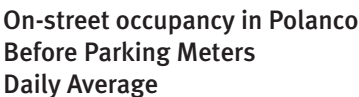
Before the implementation of ecoParq in Polanco, the average occupancy rate reached nearly 130% at peak hours. This was because nearly 30% of illegally parked cars were either double-parked or placed in a position that obstructed garage entrances, corners and sidewalks.

CHART 3: AVERAGE OCCUPANCY RATE FOR ON-STREET PARKING IN POLANCO, 2011



Source: Sañudo, 2012.

After meter implementation, a considerable number of parking spaces were freed up. Among regular parking spaces (without counting vehicles that were parked illegally or those that blocked entrances), the average occupancy rate fell from 93% to 55%. At peak demand, the occupancy rate was an average 98 percent before the meter system was implemented; this fell to 80 percent after the first year of operation. The following maps illustrate the average occupancy on sample blocks both before and after implementation. The only high occupancy areas are Polanquito and the zone adjacent to Mariano Escobedo. The areas between Masaryk and Homero streets have the lowest occupancy.

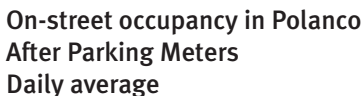





0 to 50%
51 to 85%
86 to 100%

Source: ITDP.

The following plans of sample blocks show occupancy rates that vary based on time of day, both

The following plans of sample blocks show occupancy rates that vary based on time of day, both



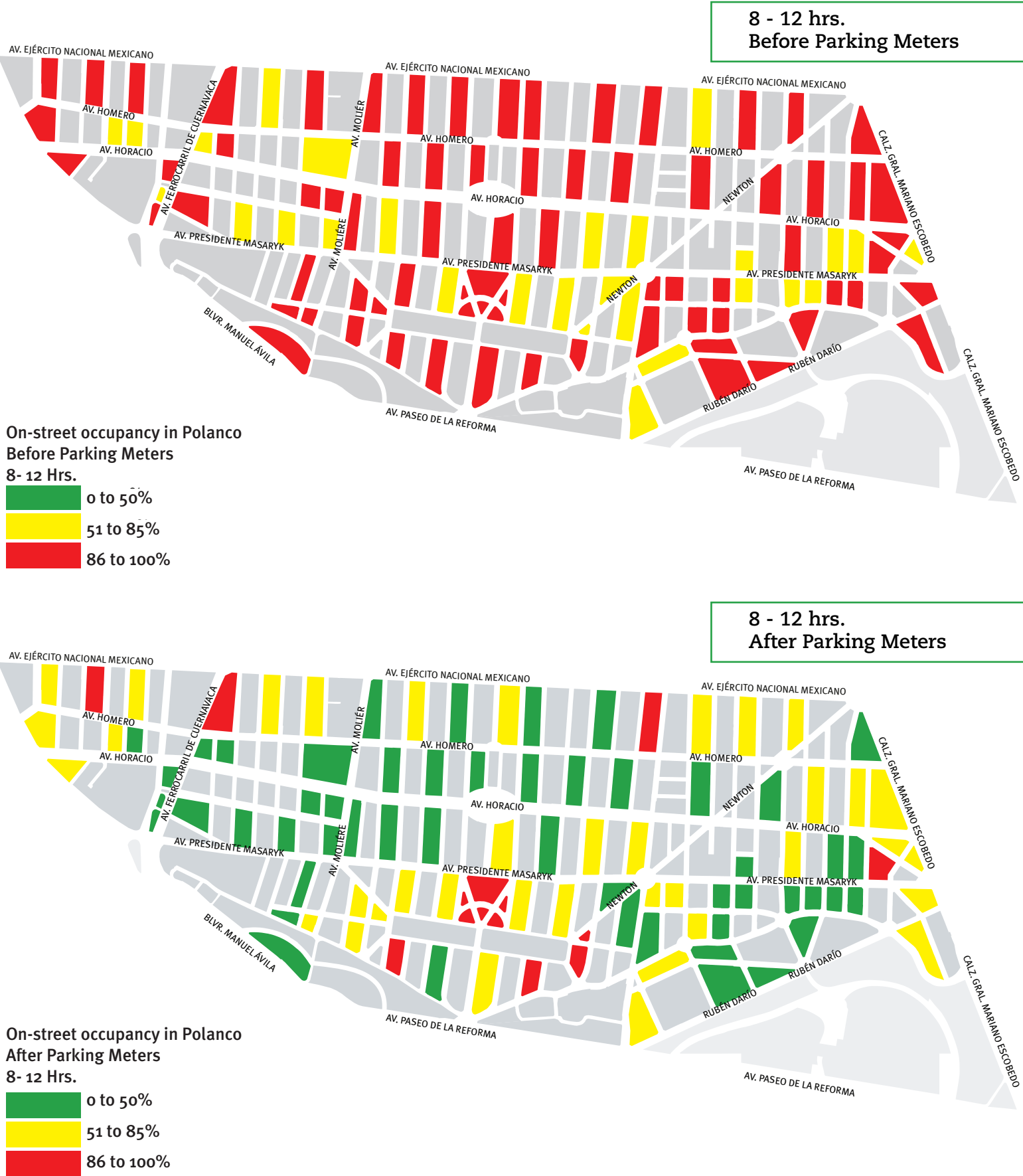
	0 to 50%
	51 to 85%
	86 to 100%

Source: Developed by ITDP with data from ecoParq.

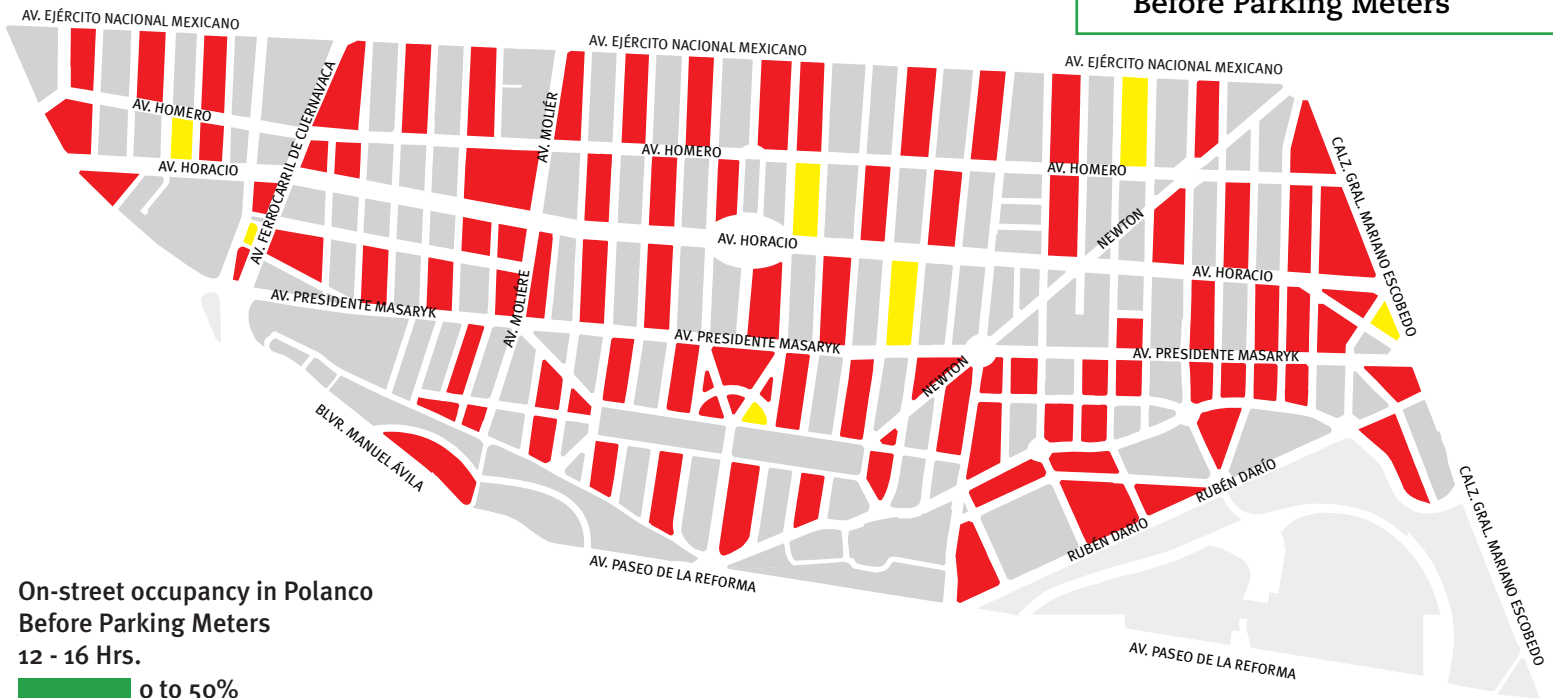
Source: Developed by ITDP with data from ecoParq.

before and after implementation of the parking meter system.

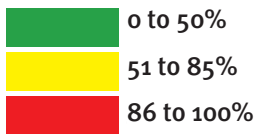
ILLUSTRATION 3: AVERAGE DAILY ON-STREET OCCUPANCY FOR CARS PARKED IN POLANCO BEFORE AND AFTER THE IMPLEMENTATION OF PARKING METERS* (percentages)



**12 - 16 hrs.
Before Parking Meters**



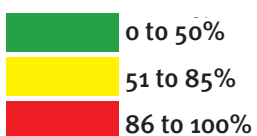
**On-street occupancy in Polanco
Before Parking Meters
12 - 16 Hrs.**



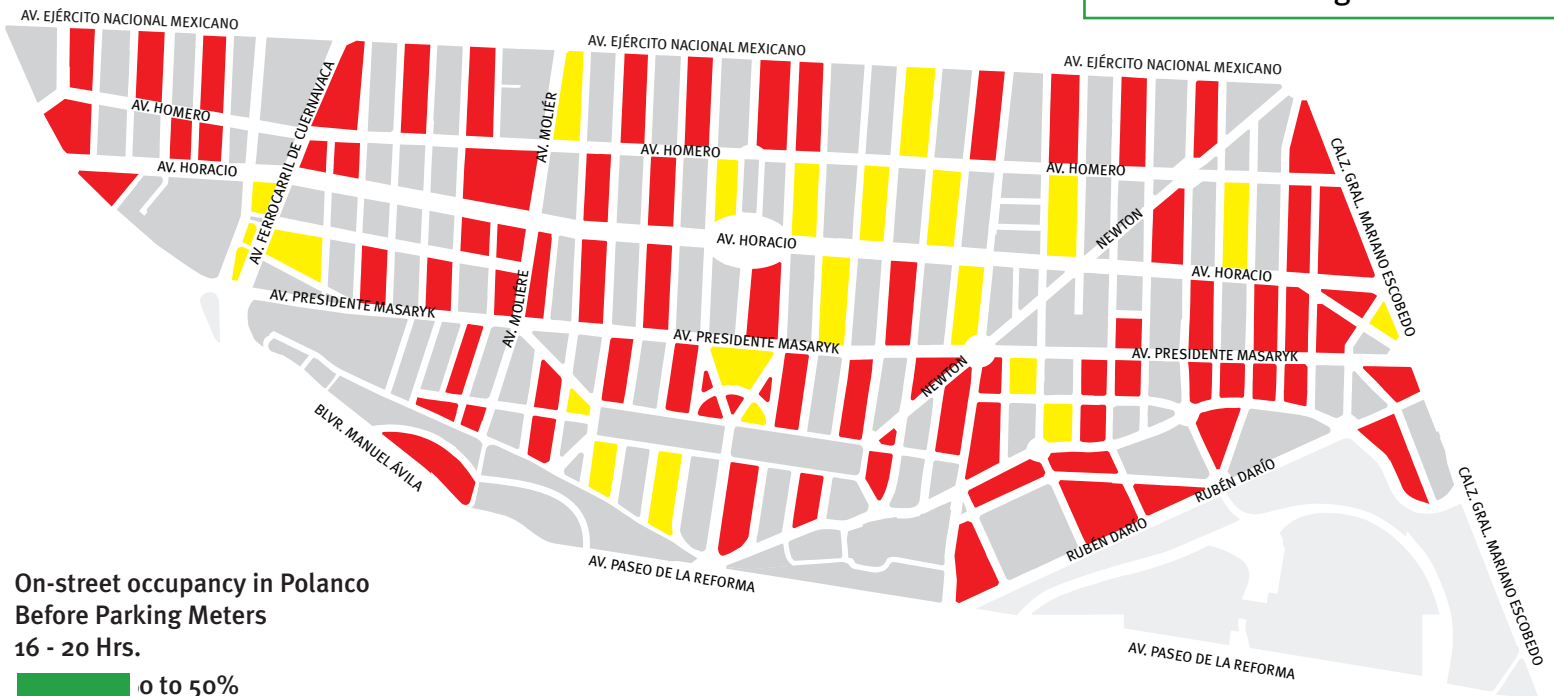
**12 - 16 hrs.
After Parking Meters**



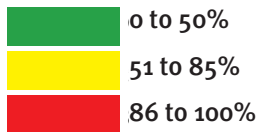
**On-street occupancy in Polanco
After Parking Meters
12 - 16 Hrs.**



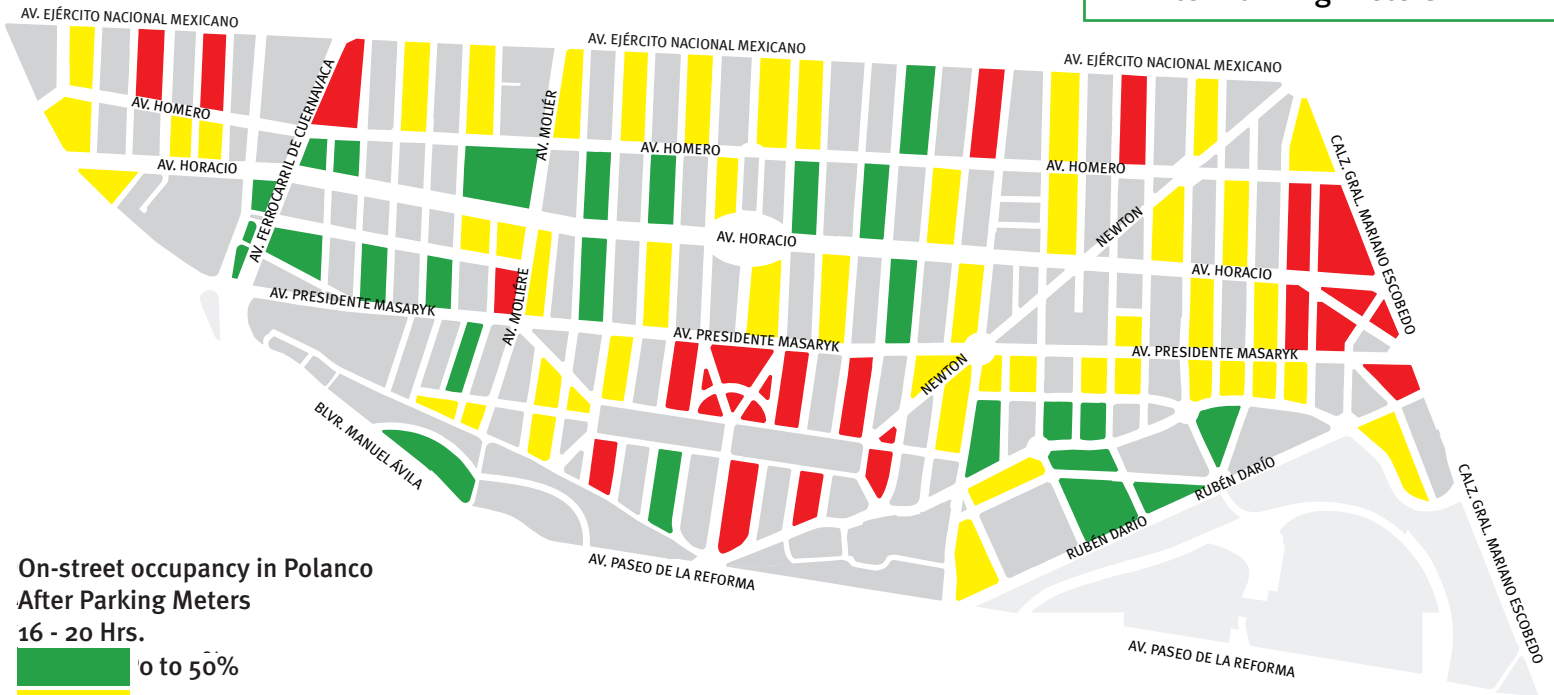
16 - 20 hrs.
Before Parking Meters



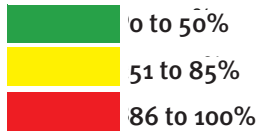
On-street occupancy in Polanco
Before Parking Meters
16 - 20 Hrs.



16 - 20 hrs.
After Parking Meters



On-street occupancy in Polanco
After Parking Meters
16 - 20 Hrs.



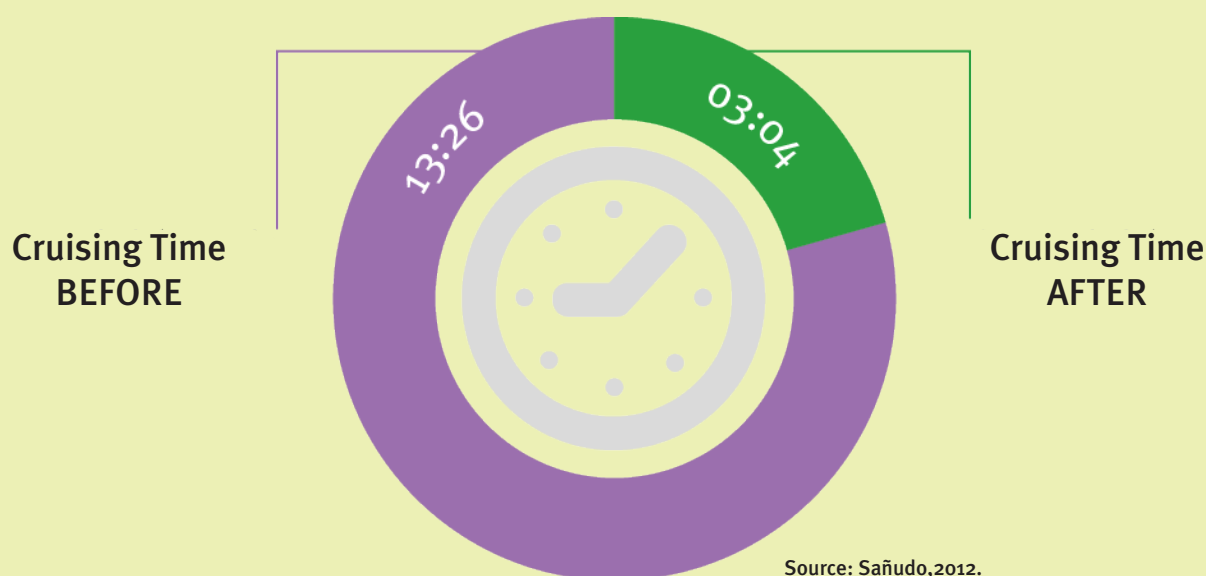
*Data for 2012 corresponds to the daily average between May and October of the same year.
Source: Developed by ITDP with data from ecoParq.



4. Cruising Time: Less time spent finding a parking space

The implementation of parking meters in Polanco resulted in lower on-street parking occupancy as well as reduced cruising time. Before, a motorist required 13:26 minutes to find a parking space; the average cruising time is now estimated at 3:04 minutes.

ILLUSTRATION 4: REDUCTION OF CRUISING TIME



This estimated reduction of 10:22 minutes per trip has resulted in benefits such as time savings, reduced emissions and cost savings:

	BEFORE PARKING METERS	AFTER PARKING METERS	SAVINGS	ECONOMIC BENEFIT
Man-hours used in search of parking space	8.72 million annual hours	1.99 million of annual hours	6.73 million of annual hours	202 million 150 thousand pesos per year
Distance trips in search of parking space	104.7 million of km	23.9 million of km	80.8 million of km	
Gasoline spent in search of parking space	9.9 million of liters	2.2 million of liters	7.7 million of liters ²	81 million 861 thousand pesos per year
C02 generated spent in search of parking space	23 thousand tons per year	5 thousand tons per year	18 thousand tons per year ³	7 million of per year

² Considering a yield of 10.5 km/lit.

³ Considering \$30 dollars per ton of CO₂.

Based only on the reduction of cruising time, the implementation of parking meters in Polanco brought social and environmental benefits in the amount of \$287,771,432 per year. The estimated savings would be higher if car use reduction is taken into account as a result of parking fees. It is estimated that the reduction is between 10% and 30% of total trips (Litman, 2006). This said, an updated travel survey must be done to accurately compare with the baseline.

5. Turnover

Before the implementation of parking meters, 57% of parked cars occupied spaces for an average of over six hours. Most of the cars belonged to workers in the area who use public parking for extended periods, precluding their use and benefit for other visitors. For this reason, on-street parking spaces showed below-average use of only 3.5 automobiles per day. Thanks to the implementation of parking meters in Polanco, the turnover rate notably increased, as each parking space is now used between 4.5 and 5.5 times per day. This implies that each space is now being used more efficiently.

6.Revenue collected

Pursuant to information published by ecoParq (2012), 57 million 698 thousand pesos were collected and 17 million 309 thousand were transferred to the AEP during 2012 as funds for the renewal of the neighborhood’s public spaces. Considering the average collected in the 4° quarter, the Polanco parking meter system raised approximately \$1,800,000 pesos each month or 21.6 million pesos per year.⁴

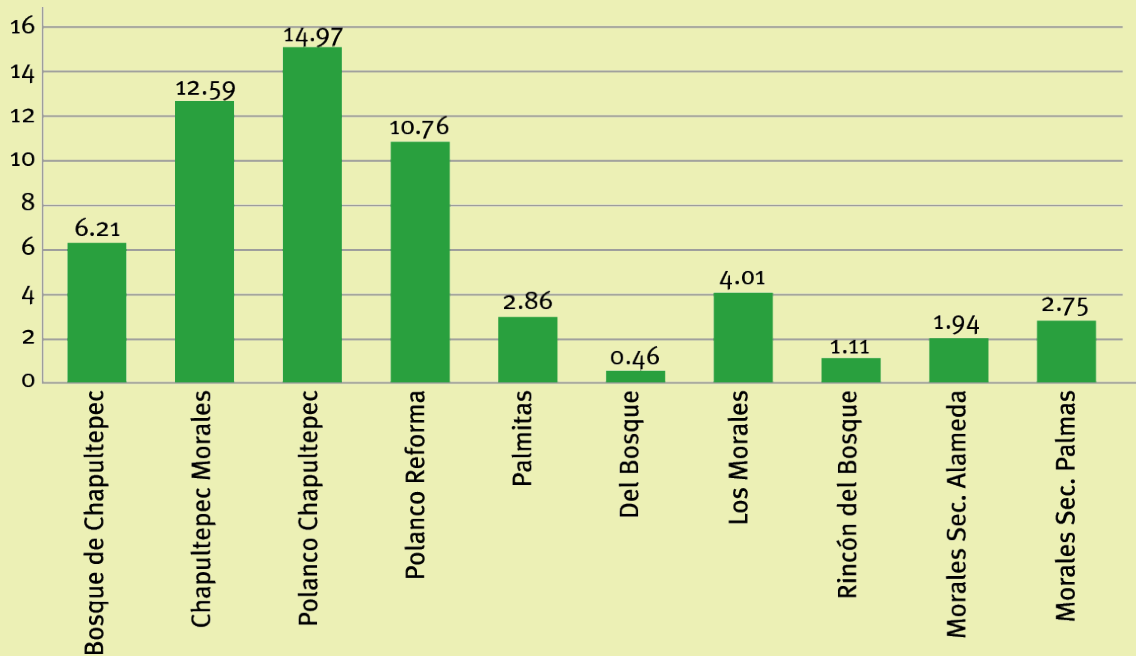
TABLE 1: REVENUE COLLECTED BY THE ECOPARQ SYSTEM IN 2012 (pesos)

	1st Quarter	2nd quarter	3rd quarter	4th quarter	TOTAL
Revenue	\$6,232,571	\$15,664,528	\$17,822,520	\$17,978,802	\$57,698,421
Share for public space renewal	\$1,869,771	\$4,699,358	\$5,346,756	\$5,393,641	\$17,309,526

Source: ecoParq, 2012.

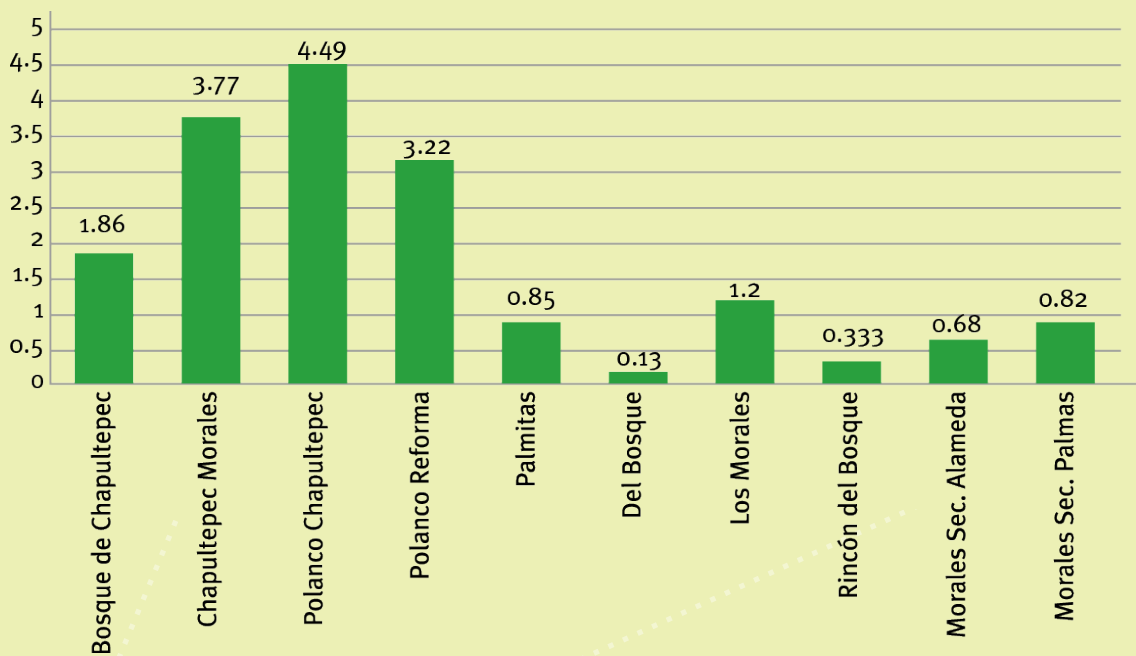
The following charts show both the revenue and funds for public space generated during 2012 as a result of meter operations in Polanco.

CHART 4: REVENUE GENERATED DURING 2012, BY NEIGHBORHOOD (millions of pesos)



Source: ecoParq, 2012.

CHARTS: FUNDS GENERATED DURING 2012, BY NEIGHBORHOOD (millions of pesos)



Source: ecoParq, 2012.



6.1. Public works projects

Currently, 30% of the funds raised by ecoParq are for the AEP, which is responsible for the recovery of public space in the neighborhood. The use of these funds is determined by the Committee on Transparency and Accountability comprised of neighborhood associations, the Miguel Hidalgo District and AEP.

Public works projects in Polanco have focused on the rehabilitation of sidewalks on Torcuato Tasso, Edgar Allan Poe and Horacio streets, as shown on the following map:

MAP 1: WORKS REALIZED IN POLANCO WITH FUNDS FROM ECOPARQ

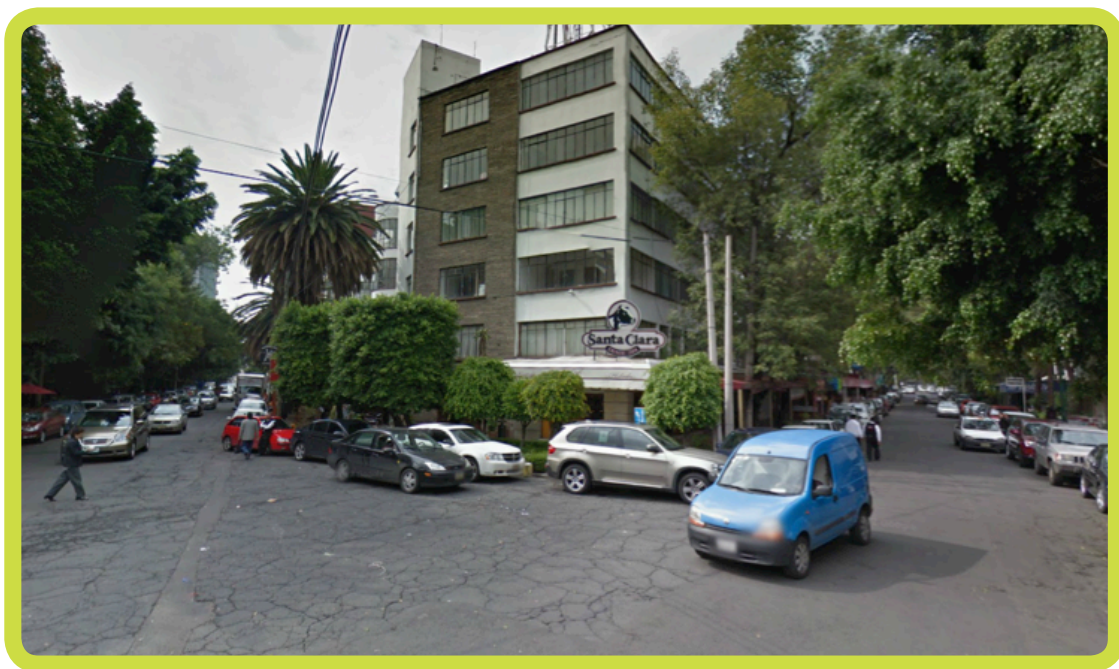


Source: Developed with information from ecoParq

In addition, a comprehensive urban revitalization project included the installation of lighting and planters plus the rehabilitation of sidewalks on Torcuato Tasso street in the area between Masaryk and Homero.

In total, 1.1 km of sidewalks were rehabilitated at a cost of 7.5 million pesos, or an average of 6,695 pesos per meter.

IMAGE 1: TORCUATO TASSO STREET BEFORE REHABILITATION



Source: Google Street View.

IMAGE 2: TORCUATO TASSO STREET AFTER REHABILITATION



Source: Paul Buendía.

IMAGE 3: EDGAR ALLAN POE STREET AFTER REHABILITATION



Source: Paul Buendía.

IMAGE 4: HOMERO STREET AFTER REHABILITATION

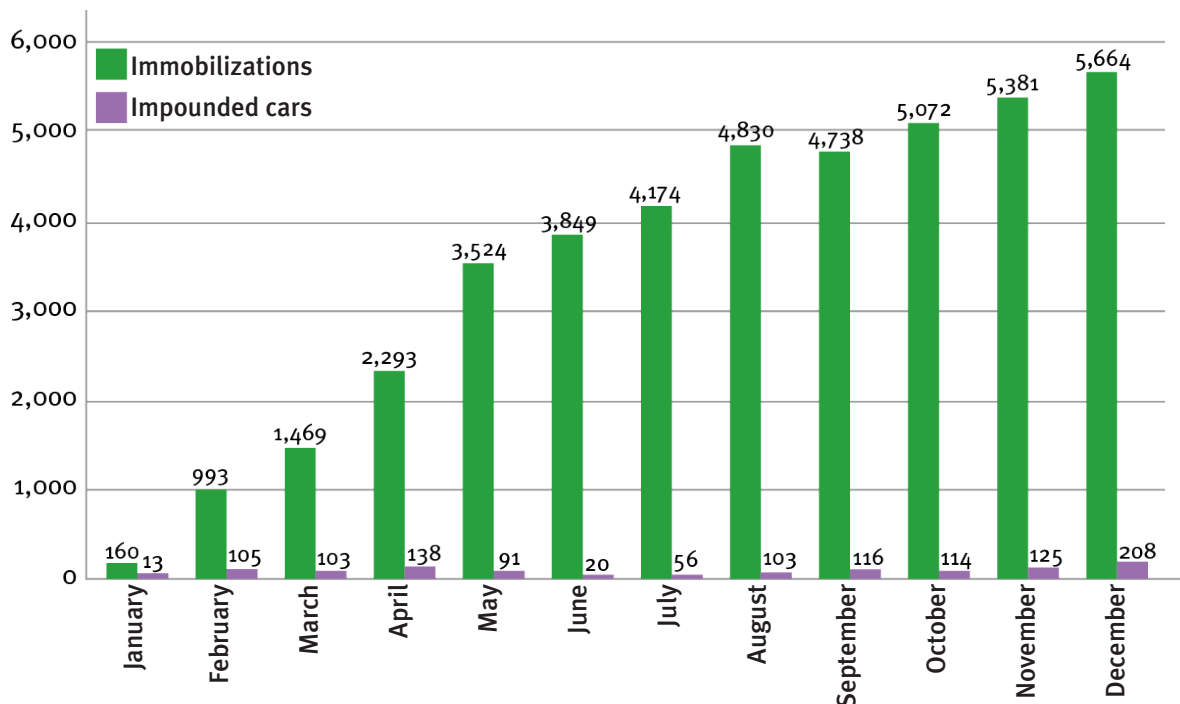


Source: Paul Buendía.

7. Ticketing.

Tickets for violating the new regulation (Article 13 of the Metropolitan Transit Regulations) have consistently increased for each month of operations. In December 2012, 5,664 cars were immobilized and 208 cars impounded.

CHART 6: CARS IMMOBILIZED AND IMPOUNDED IN 2012



Source: ecoParq, 2012.

Since the implementation of parking meters, law enforcement capacity by SSP elements has increased significantly - which is in itself a success. These figures, however, do not include fines for the immobilization of cars illegally parked on sidewalks, crosswalks or double-parked pursuant to the terms of Article 12 of the Metropolitan Transit Regulations. In order to improve and augment public space in Polanco, it is necessary to impose tickets for this type of conduct, which often affects vulnerable users: people with some form of disability and pedestrians.

8. Improvement Recommendations.

The success of parking meter implementation in Polanco has been significant. However, areas could be improved that would make operations notably more efficient, improve service and, as a result, increase and extend benefits:

1. Hours and days of operation should respond to local area demand.

Especially between Thursday and Sunday, the regulation of public space should be extended to evening hours.

2. A zero-tolerance policy should be adopted to punish any type of illegal parking.

It is important to increase and enhance the role of the Public Safety Department to improve enforcement of the Metropolitan Transit Regulations, especially with respect to Article 12. It is still common to see cars obstructing sidewalks, walkways and driveways. A parking meter system requires - especially at the beginning - the presence of a minimum number of transit officers with adequate technology and equipment in order to impose tickets and prevent infringements. Tow trucks should also be operating continuously to safeguard pedestrian areas. The use of wheel clamps to enforce parking fines is necessary to significantly reduce this common practice.

3. Adjust rates to meet local demand. Article 259 of the Tax Code, which establishes a fixed rate of 2 pesos per 15 minutes, should be amended to establish a range in which this rate is allowed to fluctuate based on the specific demand of each parking area. With greater demand, the rate will increase, and vice versa. Similarly, it is important to add rules to the On-Street Parking Control Regulations of Mexico City that serve as guidelines regarding how demand will be reviewed in order to periodically modify the rate for different areas and times as needed. The rate should be modified so that there is always a certain number of available on-street spaces (between 15% to 40% is recommended) per block at all times. A demand-based rate will serve to facilitate and strengthen both transparency and communication for citizens.

4. Establish user-information systems. The use of applications to inform users about the availability of parking spaces per block as well as public area parking should be encouraged in order to guide and influence decisions made about transportation modes. If there is no parking available, many visitors will decide to make alternative plans, and/ or choose to use public transport or bicycle.

5. **Improve revenue re-investment.** It is necessary to implement mechanisms for public-private investment to enable expeditious improvements in public space, and which are paid with potential funds from the meter system. In this way, it wouldn't be necessary to gather "small" amounts each month ("small" relative to public works) in order to make small improvements. It would thus be possible to realize real executive-scale projects and maintain rigorous works schedules a priori for the purpose of reforming many areas in less time than is possible today. Mechanisms for coordination and efficient decision making should also be implemented based on collaboration between the AEP, the District and neighbors, so that project benefits may be maximized.
6. **Augment payment options.** Allow payment to be made using both credit and prepaid cards; as well as pay-by-phone and mobile applications. As a priority, the meters must be adapted to accept payment using the City Card, similar to the systems used by both the Metro and Metrobus.
7. **Measure and evaluate systematically.** Studies and reports should be developed to facilitate a continuous analysis of program results. These reports should be made available to the general public. Constant evaluation of the system should also consider the redesign and reformulation of rates, permits and maximum stay duration, which should always have a solid technical foundation.

9. Bibliography

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Annex: Methodology for estimating benefits.

Occupancy

Occupancy plans prior to the implementation of parking meters were based on the Mobility Potential in Polanco Study, conducted by Miguel Hidalgo District (2011).

The occupancy data compiled after implementation of the parking meters were based on the same sample blocks and used ecoParq information about meters that most influence parking management of those blocks.

Operation hours were divided in 15 minute intervals between 8 to 20 hours. That is, the schedule was divided into 48 equal parts. For example, the first interval starts at 08:00:00 and ends at 8:14:59 and the fourth interval starts at 8:45:00 and stops at 8:59:59. For each influential meter (p), the following operation was realized at intervals (i)

$$\frac{BV_{pi}}{LGp}$$

Where:

BV_{pi} = number of tickets with effective time in interval i, issued by parking meter p.

LG_p = Number of parking spaces controlled by parking meter p.

The above ratio provides the estimated occupancy for interval i. This process was repeated using data from 3 months of business days and then averaged. These averages were then grouped in 3 intervals of 4 hours and averaged to obtain the average daily occupancy and the average occupancy for the following times of day:

1. Morning: from 8 to 12 hours.
2. Midday: from 12 to 16 hours.
3. Afternoon: from 16 to 20 hours.

Cruising Time and Benefits

The analysis of cruising times was done based on the Polanco Parking Meter Implementation Baseline Study (Sañudo, 2012). The points used to evaluate cruising for the baseline study were mapped in order to determine the average occupancy of the parking meters on those areas.



Based on the occupancy of the areas a conservative cruising time was assigned.

AVERAGE	ASSIGNED CRUISING TIME
Less than 50%	1minute
Between 50 and 80%	3 minutes
Greater than 80%	6 minutes

All cruising times after the implementation of parking meters were averaged, resulting in an estimate of the time a typical motorist now spends searching for on-street parking in Polanco. This led to an estimate of the time saved by visiting motorists as a result of the new policy.

The time savings also led to other benefits, as there was not only a savings of man-hours but also decreased car use, which resulted in decreased emissions and fuel consumption.

The estimate of benefits based on man-hours, vehicle-kilometers, trips, gasoline and CO₂ was realized as follows:

- **Man-hours.** Considering (a) the number of on-street parking spaces; (b) the average number of times each of these spaces is used; and (c) the fact that a certain number of trips do not involve any cruising time (e.g., the first to arrive), we made a conservative estimate of 15,000 car trips that involved cruising for on-street parking. This factor is multiplied by the savings in cruising time to produce an estimated number of man-hours saved per day. Expressed in yearly terms, it is then multiplied by a factor of 260, derived from the number of days the system runs through the year (business days excluding public holidays). The result is an estimate of man-hours saved per year thanks to additional parking space availability as a result of meter implementation. The price assigned to each man-hour is 30 pesos. This amount corresponds to the average hourly wage of a worker in the ZMVM, based on the National Survey of Household Income and Expenditure of the INEGI⁶.
- **VKT.** In order to estimate vehicle-kilometers traveled as a result of the reduction in cruising time, an average speed of 12 km / h was used, based on the estimated speed at which a typical motorist “cruises” in search of on-street parking. The savings in man-hours is then multiplied by this factor to obtain an equivalence in VKT

⁵ A conservative estimate is assigned to cruising time, based on the premise that if the final destination of a given trip is one block away in a place where at least half the estimated on-street parking spaces are available, the driver will normally not need more than a minute to find a spot. Similarly, when between 49.9% to 20% of spaces are available, the probability of finding a space continues to be high, for which reason a typical motorist should not need more than 3 minutes. When the average occupancy of the area exceeds 50%, it is likely that drivers will spend additional time cruising for a space. The neighborhood's features, however, normally make it possible for this to occur within a maximum radius of 2 blocks. For this reason, finding a space rarely requires more than 6 minutes. su auto.

⁶ This estimate may be conservative, as it fails to take into account other opportunity costs in relation to time use (e.g., leisure time) which may be deemed to have more value than a typical work hour.



- **Gasoline.** Considering an average yield of 10.5 kilometers per liter based on vehicle availability and frequency (Sheimbaum, et al., 2011), the savings in VKT was divided by this factor to obtain the savings in gasoline liters. Once the number of liters has been estimated, this figure is multiplied by the price per liter of gasoline in effect at the time to obtain the total sum of gasoline savings in monetary terms.
- **Emissions.** The emissions estimate follows the same methodology used in Sañudo (2012), which assumes that every consumed liter of gasoline generates 2.347697 kilograms of CO₂ per liter (EPA and NHTSA, 2012). Thus, the number of kilograms of CO₂ generated within the Polanco neighborhood by private cars is estimated to be:

$$\text{kgCO}_2 = \text{KVR inside Polanco} * (\text{kgCO}_2/\text{Liter}) / (\text{km/Liter})$$

The price per ton of CO₂ was considered to be \$30 dollars (Stern, 2007) and the FIX exchange rate used was on December 31, 2012 – 12.9658 pesos per dollar.



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