



Transforming Urban Mobility in Mexico

Towards Accessible Cities Less Reliant on Cars

2012

Institute for Transportation and Development Policy (ITDP Mexico)



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Glosario

Accessibility	Ease of access to one's destination.
Mobility	Capacity to move from one place to another.
Mobility management	Set of strategies focused on changing the travel behaviour of people (how, when, and where people travel).
Automobile/Car	Small or medium sized motorised vehicle destined for transporting people, with a capacity of less than 9 seats. These are normally subdivided into subcompact, compact, luxury and sport vehicles.
Road capacity	Maximum number of vehicles that can travel along a road during a given period of time at a speed considered flowing or ideal.
Road congestion or traffic	This occurs when the movement or circulation of vehicles (demand of use) comes close to the maximum road capacity and the travel time increases to a value higher than what occurs when demand is low.
Deciles of income	The division of the total population of the country into ten groups according to income bracket.
Urban development	Process of growth of a city, planned or not, in which the provision of services considered urban (streets, water, drainage, electricity, etc.) is increased.
Sustainable development	Satisfying the needs of the present generation without compromising the capacity of future generations to satisfy their own needs.
Externality	The damages or benefits experienced by a third party or group of third parties caused by the actions of other persons or entities. They are said to be negative when they harm the third party, and positive when they benefit said third party. An example of a negative externality is the air pollution generated by a factory that is harmful to local inhabitants.
Vehicle ownership index	This is a relative measure of car ownership among the population in an area or a country. It is defined as the number of cars registered per thousand inhabitants.
Induced traffic	This is the new and growing flow of vehicles generated by the construction of a new road or by improvements to an existing one.
Sport Utility Vehicle (SUV)	Motorised vehicles that combine elements of a car and of an all-terrain vehicle.
Motorised vehicle	Transport mode for people or things whose traction comes from an engine, whether internal combustion, electric, or hybrid.
Trip	Moving from one place to another, starting from a point of origin and ending in a destination. The motives for the trip are varied: access to goods and services, socialising, work, etc.

Executive Summary

Transport policies can have a significant impact on the economic development of the country and therefore on the quality of life of the Mexican people. Transportation is critical to economic activities (transporting goods and merchandise, commuting to work, transportation for tourists, and shopping, among others), and efficient transport systems have the potential to further economic and social development of Mexico. They will also reduce the externalities or negative costs imposed on society by the use of the automobile, such as: economic losses due to traffic congestion, costs related to health, accidents and environmental damage, among others.

At present, in Mexican cities, transportation is dominated by automobile use, and it outweighs the economic and social benefits of living in a city. This is predominately because car users only cover their own private costs related to the use of their cars, but not the social costs of increased congestion and poor air quality generated as a result of it. This generates questions if society should absorb the construction and maintenance costs of infrastructure required by select private motorists. This becomes more political when compared the poor quality of urban public transport services Mexico, as well as by the haphazard urban development experienced over the last few decades.

Recent estimates point to an alarming trend in increased car use in the last two decades, as the kilometres travelled by vehicles in the country (VKT – Vehicle-Kilometre Travelled) have practically tripled, moving from 106 million VKT in 1990, to 339 million VKT in 2010 (Medina, 2012).

This growth, given the conditions of public transportation and urban development, means that urban mobility becomes so inefficient that not only does it not contribute to the country's economic development, but it affects the quality of life of its inhabitants, due to the serious costs it generates and that are not covered by those generating them.

The increase in automobile use has also upset Mexico's trade economics. 30 percent of Mexico's income comes from the production and export of oil (OECD, 2010). With the increase in automobile use and increased need for gasoline, Mexico has begun importing gasoline and it has become the principal import in the country (147 billion Pesos in 2010¹). National gasoline price stabilisation mandates international price comparison, resulting in a 76.6 billion Pesos subsidy in 2010 and estimated to be 169.5 billion in 2011². This is more than the amounts spent on national poverty alleviation programmes combined. This policy is regressive in nature, as 70% of this subsidy supports the wealthiest third of the population (Scott, 2010 and 2011). This not only contributes to the external fragility of the economy, but puts pressure on public finances and creates social inequality.

¹ Amount of gross transfer from Art. 2-A, fr. I of the Special Tax on Production and Services (IEPS), which includes diesel (Reyes, 2011)

² According to information as of the fourth quarter of 2011 from the Ministry of Finance and Public Credit.



Furthermore, local pollution generated by gasoline combustion is estimated to be linked to the almost 14 thousand deaths in 2008 due to poor air quality, according to the World Health Organization (WHO, 2012). 24,000 deaths, 40,000 handicapped and 750,000 wounded a year are caused by road accidents and cost 126 billion Pesos a year, or, approximately 1.3% of GDP (Ministry of Health, 2010b and Cervantes, 2009).


Private cars are responsible for generating 18% of carbon emissions in the country. These emissions contribute massively to climate change and is estimated to cost Mexico up to 6% of current GDP if appropriate preventive measures are not taken (Galindo, 2009).

The economic impact of increased car use represent 5,379 Pesos per inhabitant or the equivalent of 4% of the total GDP in the 5 largest metropolitan areas in the country – which constitute 40% of the national urban population (Medina, 2012). If the vehicle fleet continues to grow to the expected 70 million vehicles by 2030, the expected problems will continue to increase (CTS-INE, 2010).

This increase in automobile use in recent years is the result of implicit federal public policies, such as the gasoline subsidy, the recent elimination of the car ownership tax, lack of national policies on mandatory insurance, open trade policies and, indirectly, the fiscal policies. The prioritization of road infrastructure also contributes to the increase in automobile use. The last point requires special attention, because, the prioritization of infrastructure for cars, the improvement and expansion of public and non-motorized transport becomes secondary. The nature of this public policy is thus regressive and inequitable.

These inadequate public policies are emblematic of a larger problem: the lack of a national urban mobility policy and the governance structures needed to address and monitor the financing and creation of projects. [the short periods of government of the municipalities, the lack of coordination of the three levels of government, the lack of transparency in public expenditures, the abandonment of urban planning and the lack of information on car use, among others.

The severe consequences of increased automobile use in Mexico necessitates its positioning as an important domestic public policy objective. It should be measured by the Vehicle-Kilometre Travelled (VKT) indicator at the national level, per capita and average per vehicle at the urban level.



To this end, a shift is required in the federal public policy paradigm in matters of transportation and urban mobility, leaving behind the current one, which is focused on maintaining and increasing the flow of vehicles and strongly centred on the use of the automobile, to a new paradigm oriented to the accessibility of people to goods and services.

This change in the mobility model in cities will allow for advancements in the reduction of the reliance on the car along three lines:

- **Avoid** unnecessary motor vehicle trips and **reduce** the average distance of those made.
- **Shift** to more efficient transport modes such as non-motorised transport (walking or cycling) and public transit; and
- **Improve** the performance and energy efficiency of motorised transport such as private cars, for the purpose of reducing its negative externalities.

In this regard the following is suggested:

- A. The creation of a federal institutional, regulatory and financial platform that allows for implementing a long term public policy for moving towards compact cities with sustainable urban transport and reduced car use. For this to occur, a Ministry or section of government will have to be created at the federal level specializing in mobility issues and must include the creation of a corresponding supporting legal and planning structural framework; financing for urban transportation and mechanisms for the technical assessment of the projects to finance will have to be generated; and there must be a system of information on mobility in Mexico's cities.
- B. Immediate implementation of federal and local fiscal policy actions oriented to a user-financed model and that allows for the generation of the necessary resources for the financing of public and non-motorised transport. Measures such as the elimination of the gasoline subsidy or the establishment of environmental fees for the automobile directed to reducing its externalities.
- C. Auxiliary measures to be implemented in the medium term that allow for consolidating the previous policies, such as fostering research and development on the topic of urban transport.
- D. Strategies for states and municipalities focused on reduced car use and improved public transport and accessibility of goods and services.

1. Introduction: Public Policy and the Need to Reduce Car Use

Transport policies play a fundamental role in the development of a country's economic activities. As such, if they are directed to making transport systems efficient, they will drive economic and social development and reduce the negative externalities (economic losses caused by traffic congestion, health-related costs and environmental damages, among others) imposed on society from the unrestrained use of cars.

Currently in Mexico, commuting or getting around includes diverse modalities, but the excessive use of the automobile is cancelling out the economic and social benefits of living in a city. Urban mobility is so inefficient that it is provoking serious economic, social and environmental costs associated with unrestrained car use.

It is estimated that the economic losses derived from the negative externalities from car use represent an average of 4% of GDP of the 5 metropolitan areas in the country³, of which 42% of the country's urban population is concentrated (Medina, 2012). This situation will be further aggravated by the continuous growth of the vehicle fleet, which grew from 7 million in 1990, to 22 million in 2010, and is estimated to reach 60-70 million vehicles by 2030 (CTS-INE, 2010).

This trend must not be allowed to continue, lest it will seriously affect the economic and environmental viability of these cities and, consequently, of Mexico itself. The current urban development paradigm must be changed, and with it those of mobility and transportation, so that Mexico provides sustainable and accessible transportation for the entire population.

For this to occur, the costs currently taken on by the public sector must be transferred to the costs of the private car users themselves. A national policy is urgently needed that coordinates the three branches of the government (federal, state and municipal) focused on achieving a greater and better displacement of persons and reduction in car use by means of integrated mobility management.

³

Metropolitan area of the Valley of Mexico, Guadalajara, Monterrey, Puebla-Tlaxcala and León.

1.1 The Role of Information in the Design of Public Policies

One of the main problems in designing public policies on mobility is the lack of reliable information on the levels of car use, both at the national level and in urban areas, measured in vehicle-kilometres travelled (VKT). Likewise, there has been little analysis of the negative externalities (economic, social and environmental) associated with high rates of car use.

The absence of information has enabled the continuation of a car-centric paradigm that, has occupied a large part of public spending. Most notably, this has fuelled the construction of urban motorways (see Orozco & Palmerín, 2011, and Iracheta, 2010).

Recently, public policies that have addressed mobility issues in the developed world have changed. More and more, policies have been implemented that focus on accessibility to goods and services for people and not on those for motorists. In 1994, the United Kingdom changed policies to discourage car use (Gongora, 2012b), and in 2003, London implemented a congestion charge to reduce vehicular traffic in the city center and encourage the use of public transport and non-motorised vehicles. The measure managed to get 20,000 automobiles to refrain from travelling in the City of London, and stabilized the flow of vehicles in the area (TfL, 2004 and Litman, 2011). Stockholm, Sweden and Singapore have also instituted congestion charges and have obtained similar results.

In large cities in Japan, the costs of owning a car are transferred directly to the users. In Tokyo, one of the most economically competitive cities in the world, parking on public roads is forbidden (Barter, 2011), and cars cannot be bought unless the owners prove that there is a parking space already available for it. Even though Tokyo has one of the highest vehicle ownerships in the world, this policy has enforced moderate automobile use and managed to maintain an efficient mobility system. This has contributed to Tokyo being one of the most economically competitive cities in the world (Sassen, 2001). Similar cases are found in Paris and Copenhagen, where each city has systematically reduced the quantity of parking spaces without negatively affecting their economic competitiveness (Kodrinsky and Hemann, 2011).

In light of the aforementioned international experiences, implementing a strategy of integrated mobility management is necessary in cities. This system would focused on **avoid** or **reduce** car trips, **shift** towards public and non-motorised transport (walking or cycling), and **improve** the performance and energy efficiency of motorised transport. The mobility management strategy must include, in its principal objectives, the reduction of kilometres travelled in cars. This objective, which is viable, possible and desirable, will allow for the creation of cities that are sustainable and competitive and that offer better living conditions throughout Mexico.

BOX 1: PRODUCTION, CAR USE AND ECONOMIC GROWTH

There is no direct positive correlation between automobile production, car use in an urban setting, and level of wealth. On the contrary, there is evidence of cities in countries with high automotive production that have low car use and a high standard of living.

One example of this is the city of Tokyo, which has 13 million inhabitants (2011), a density of 6 thousand persons per sq. kilometre, and where approximately 12% of trips are taken by car (2008). Tokyo has a high rate of vehicle ownership, 450 per 1000 inhabitants not including metropolitan area, and is considered a global financial capital (Sassen, 2001) and, one of the most competitive with a GDP per capita of 29,000 USD (PPP-base 2002). It has one of the most restrictive policies for car ownership in the world, requiring the buyer to prove an available off-street parking space exists prior to purchase (Barter, 2011). Coincidentally, Japan is the second highest producer of light-duty vehicles in the world, with 8.3 million units in 2010.

If Tokyo's is compared to Mexico City's Federal District, there is an obvious increase in car use in Mexico City (20% of trips, according to the INEGI, 2007), despite both cities having similar populations and densities (8.8 million inhabitants and a density of 5,862 persons per sq. km in 2010), lower vehicle ownership rates (353 vehicles/1000 pop. in 2009) and lower income per capita (14,000 USD -PPP base 2002). At present there is no local or national policy in place that limits the purchase of automobiles. Additionally, Mexico is the tenth producer of light-duty cars in the world (1.3 million units).

Policies intended for mobility management and car use reduction do not intend to have with a harmful effect on the economy. On the contrary, the objective is to make mobility in cities more efficient, which generates benefits for all inhabitants, including businesses and government.

Tokyo and Federal District Comparison

	Tokio*	Federal District
Inhabitants	13 million (2011)	8.8 million (2010)
Density	6 thousand persons per sq. km (2011)	5,862 persons per sq. km (2010)
% of car trips	12% (2008)	20% (2007)
GDP	29,000 USD (PPP base 2002)	14,000 USD (PPP base 2002)
Vehicle ownership rate	450 vehicles for every 1000 inhabitants (2001)	353 vehicles for every 1000 inhabitants (2009)
World placement in production of light-duty automobiles 2010.	Second: 8.3 million units in 2010	Tenth: 1.3 million units in 2010
Restrictions for purchasing an automobile	Proving that one has an assigned parking space	None

*Does not include metropolitan area for purposes of comparison.

Sources: Barter (2011), Kebin et al. (2003), CTS México-INE (2010), OECD (2009a), Litman, (2011), Mitsuyuki (2010) INEGI, 2007 and data from International Organization of Motor Vehicle Manufacturers.

1.2 Objectives and Structure

This report analyses the current situation of car use in Mexico, its causes and effects on quality of life and on the economic development of Mexico. The intention is to instigate a necessary discussion on how to improve urban mobility in Mexico.

This report contains five sections. The first posits the importance of reduced car use in Mexico. The second section describes up national policies and attitudes around car use, as well as policies that have provided incentives for car use. The third section presents essential elements to be included in a national mobility strategy for Mexico. The fourth section presents a series of proposals and specific recommendations for federal public policy to facilitate the creation of a mobility strategy for Mexico and support the economic development of the nation. The fifth section draws conclusions and emphasises the importance of these policies for Mexico.



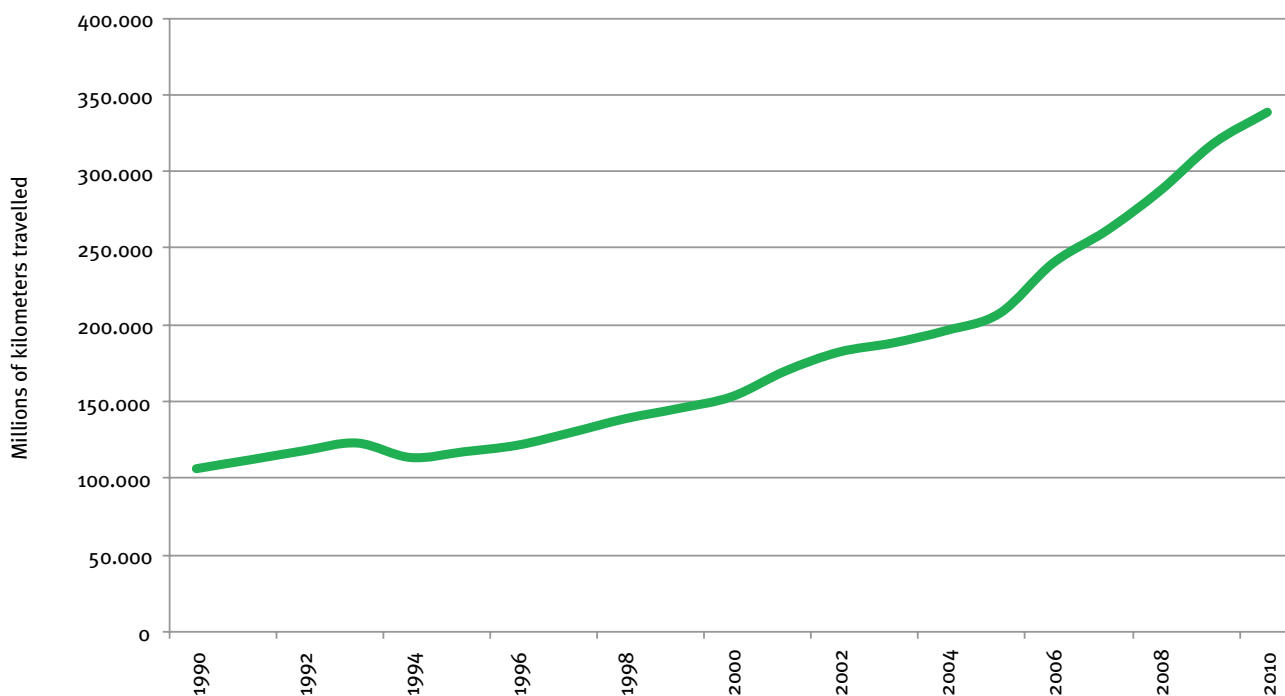
2. National Situation of Car Use

Urban mobility, is defined as the ability to move from one place to another (Handy, 2002), is fundamental to economic and social development and quality of life of the inhabitants of a city. For a long time now associating mobility with car use has been a distinctive sign of progress. But this association is no longer possible today. The growing and indiscriminate use of the automobile – fostered focused public policies erroneously associated with sustainable mobility – generates enormous negative impacts at the economic, environmental and social level throughout Mexico.

2.1 Car Use in Mexico

During the past two decades there has been an alarming tendency of an increase in car use in Mexico. The vehicle-kilometres travelled (VKT) have tripled, moving from 106 million in 1990, to 339 million in 2010⁴ (see *Graph 1*). This simultaneously correlated with an increase in the negative externalities generated by cars (smog, accidents, illnesses, congestion, etc.).

GRAPH 1: TOTAL VEHICLE-KILOMETRES TRAVELLED BY THE LIGHT-DUTY VEHICLE FLEET IN MEXICO, 1990-2010



Source: ITDP, with data from the INEGI.

⁴ For a detailed explanation of these estimates see the base study for this document: “The importance of reduced car use in Mexico. Tendencies in car ownership, in car use and in their impacts”. (Medina, 2012).

BOX 2: THE IMPORTANCE OF THE VEHICLE-KILOMETRE TRAVELLED INDICATOR MEASUREMENT

The vehicle-kilometre travelled (VKT) data provides crucial information on vehicle traffic volume and its growth over time. It is the first look at the number of car trips made on a given road or in a given area of study; that is to say, the measurement is a function of the number of trips observed and the distance of same. This data is used to generate statistics for planning purposes with regard to issues of accidents, assigning of funds for infrastructure, and extrapolation of tendencies for determining the probable future of transport activity, both mercantile and people-related. It is especially used to observe tendencies in the intensity of the use of energy in the transportation sector in the long run. It is also used for calculating estimates of polluting gas emissions from motor vehicles, as, analysed in combination with the indices of pollution by distance travelled, this represents an estimate of the total amount of vehicular pollution in a given period of time.

This implies that, in obtaining the most precise measure of VKT possible, precise indicators can be obtained of the quality of the air and its tendency. This allows, once national standards have been set, for an identification of the regions in which it is necessary to apply programmes meant to discourage car use and thereby keep polluting gas emissions under control.

The highest absolute increase in VKT is experienced in the metropolitan area of the Valley of Mexico (ZMVM), which has gone from 30,000 vehicle-kilometres travelled (VKT) in 1990 to 84 million in 2010. This represents a automobile growth rate of 5.3% a year. Population growth at the time was 1.29% per annum.

Many cities in Mexico have a greater relative growth in car use than in the ZMVM (*see Chart 1*), indicating that the problems experienced in Mexico City were replicated throughout the country.

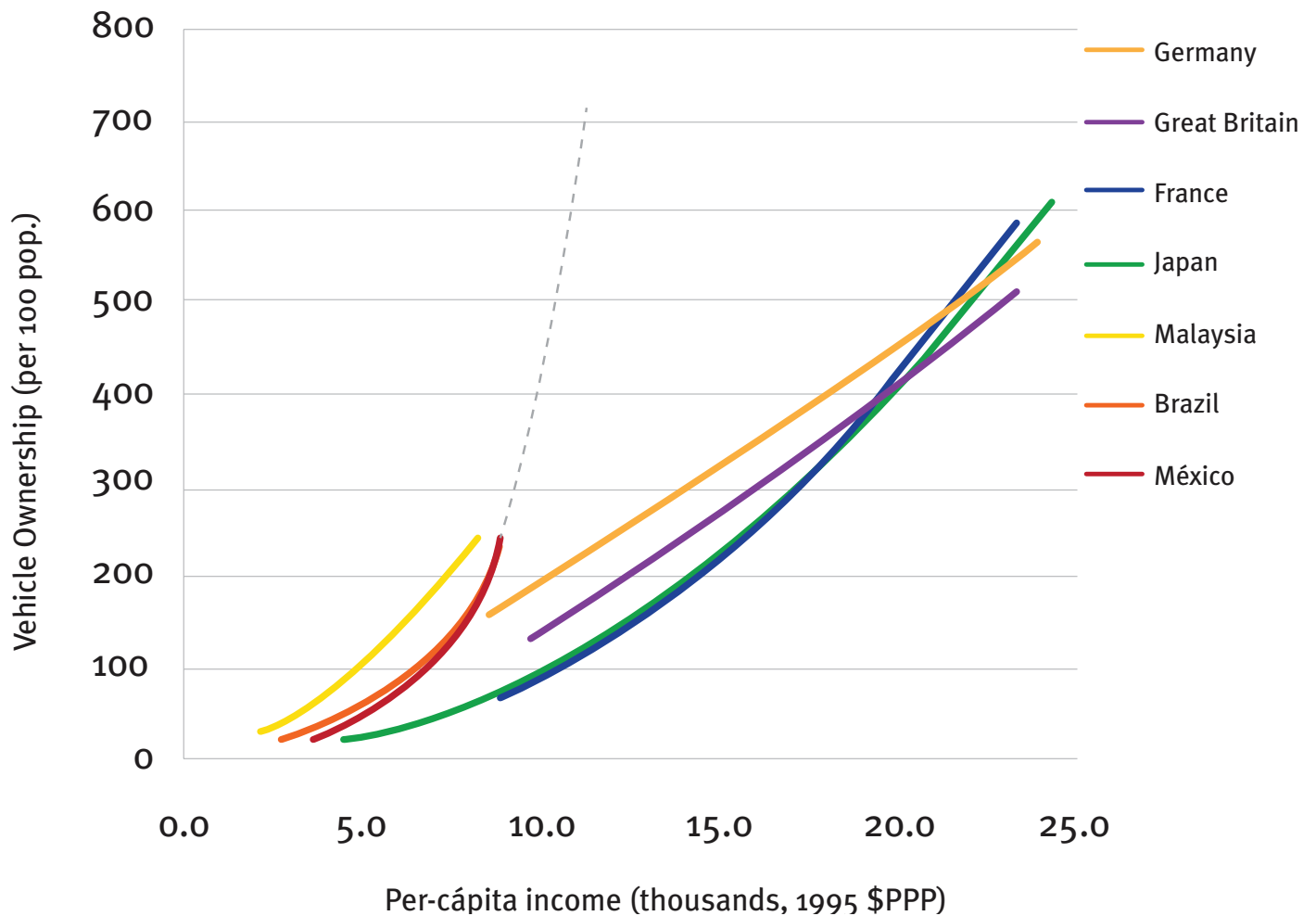
**CHART 1: TOTAL VKT IN DIFFERENT METROPOLITAN AREAS IN MEXICO
and AVERAGE GROWTH RATE PER ANNUM, 1990-2010**

METROPOLITAN AREA	VKT 1990 (millions of km)	VKT 2010 (millions of km)	ANNUAL AVERAGE GROWTH RATE
ZM Querétaro	468	2,803	9.4
ZM Monterrey	2,823	15,335	8.8
ZM Aguascalientes	549	2,942	8.8
ZM León	571	3,018	8.7
ZM Veracruz	436	2,042	8.0
ZM Chihuahua	59	273	8.0
ZM Tuxtla	561	2,533	7.8
ZM Guadalajara	4,278	18,976	7.7
ZM Tijuana	1,523	5,663	6.8
ZM Puebla -Tlaxcala	1,809	6,210	6.4
ZM Mexicali	1,730	5,821	6.3
ZM Valley of Mexico	29,991	84,552	5.3

Source: Medina, 2012.

The level of car use in Mexico is still below that of economically developed countries, but the rapid increase in Mexico's vehicle fleet signals that it will soon reach vehicle ownership levels similar to those in developed countries. The estimates indicate that by 2030, the vehicle fleet will be 70 million units (CTS-INE, 2010), made up primarily of cars and SUVs (sport utility vehicles) (see Graph 2). If car use is not regulated with the intention of mitigating and compensating for the negative externalities that will be generated, this could multiply the toxic effects on Mexican society.

GRAPH 2: RELATIONSHIP BETWEEN PER CAPITA INCOME AND VEHICLE OWNERSHIP, AND TREND FOR MEXICO

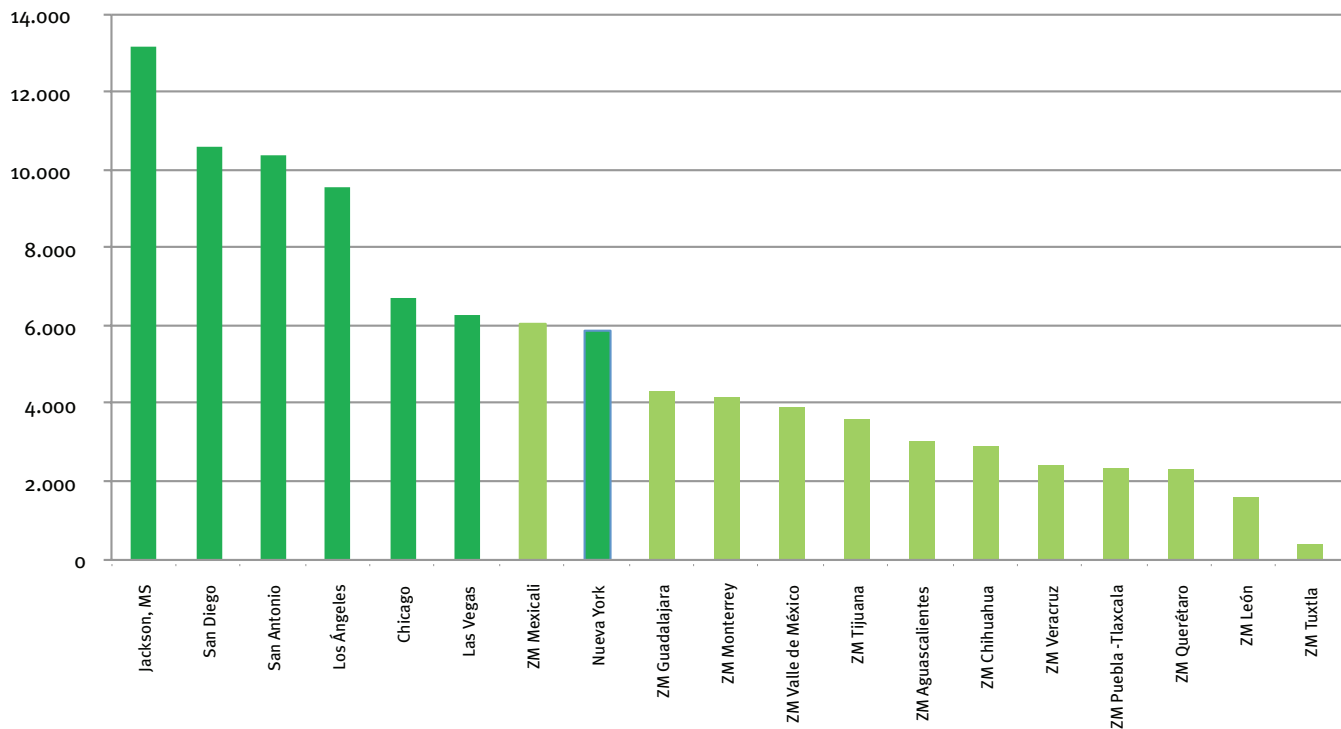


Source: CTS - INE, 2010.

Due to Spanish influence, Mexico has a more compact urban development model (Fernández, 2000) than the United States. However, if vehicle ownership and use continues as at present, levels of car use will reach level similar to the United States, and the urban growth model will change to become sprawling and low density⁵.

The case of Mexicali is an example of this, as its car use comparable to metropolitan areas in the United States like Chicago, Las Vegas and New York. Cities like Monterrey, Guadalajara, Mexico City and Tijuana are rapidly approaching these patterns and levels of car use and urban development (see Graph 3).

GRAPH 3: VEHICLE-KILOMETERS TRAVELLED PER CAPITA IN MEXICAN AND US CITIES, 2006



Source: Federal Highway Administration and own calculations

2.2 Public Policies Promoting Car Use

The increase in car use (as calculated by VKT) and the related negative impacts in Mexico are the result of national and municipal public policies that have little understanding of the mobility plight, and no criteria for sustainability, that have incited car use indirectly and underestimated its negative impacts.

Policies that have incentivised car use are: gasoline subsidy, the elimination of a car ownership tax, the lack of mandatory national third party insurance policies, open trade policies that facilitate the import of cheap and used cars, the financial mortgage and automotive credit policies associated with urban planning, and the prioritization of public funds towards infrastructure improvements that benefit private transport (ie roads). The last point has been particularly detrimental; prioritizing road infrastructure benefits private car owners and simultaneously neglects the improvement and expansion of the public and non-motorised transport options. Instead of increasing road capacity lessening congestion, expanding road infrastructure has the opposite effect, inducing more car-based travel and thus more congestion. This phenomenon is known as *induced traffic* (see Box 3).

BOX 3: INDUCED TRAFFIC

When considering how best to solve the traffic problem, the solution always seems to focus on how to increase the space so that cars are able to move around; how to improve – for and by cars – the existing roads; how and where to build under- or overpasses, second floors, new streets and rapid transit roads. But these “solutions”, thought up as a function of the automobile, do not solve the traffic problem, they merely induce it.

By induced traffic we mean the new and growing vehicle traffic that new roads generate. Litman (2011b) points out that traffic, just like gases, has a growing demand for space (the more space it occupies the more it expands), so that by increasing the offering of roads, traffic is merely increased. This is due to the fact that a greater offering of roads makes car use less expensive, in the short term, thanks to shortened trip times and less fuel used.

Galindo and Heres (2006) have confirmed the existence of induced traffic in Mexico City. Their results show that when a road allows a trip that used to take 60 minutes to be reduced by 6 minutes, an increase of 3.8% in the volume of traffic ensues. If the trip used to take 120 minutes, the 12-minute reduction makes the volume of traffic grow by 7.6%, and by 11.3% for 180-minute trips. These results indicate that building new roads in Mexico City has limited benefits over time and that the strategy to build more streets to reduce traffic will, in the medium and long term, fail.

2.2.1 Pricing and Gasoline Subsidy Policy

The gasoline subsidy controls the price of gasoline and has been used to artificially maintain the cost of gasoline in the country. These price controls in Mexico prevent the cost of fuel from reacting to variations in the international oil market (Reyes, 2010).

Stabilising prices has made car use less expensive per kilometre travelled and has consequently created incentives to buy and use cars. During 2010 the gasoline subsidy was for 76.6 billion Pesos ⁶ and it is estimated that in 2011 it will reach 169.5 billion Pesos ⁷. This policy distorts the market as it masks the scarcity, production costs or the externalities associated with gasoline fuel.

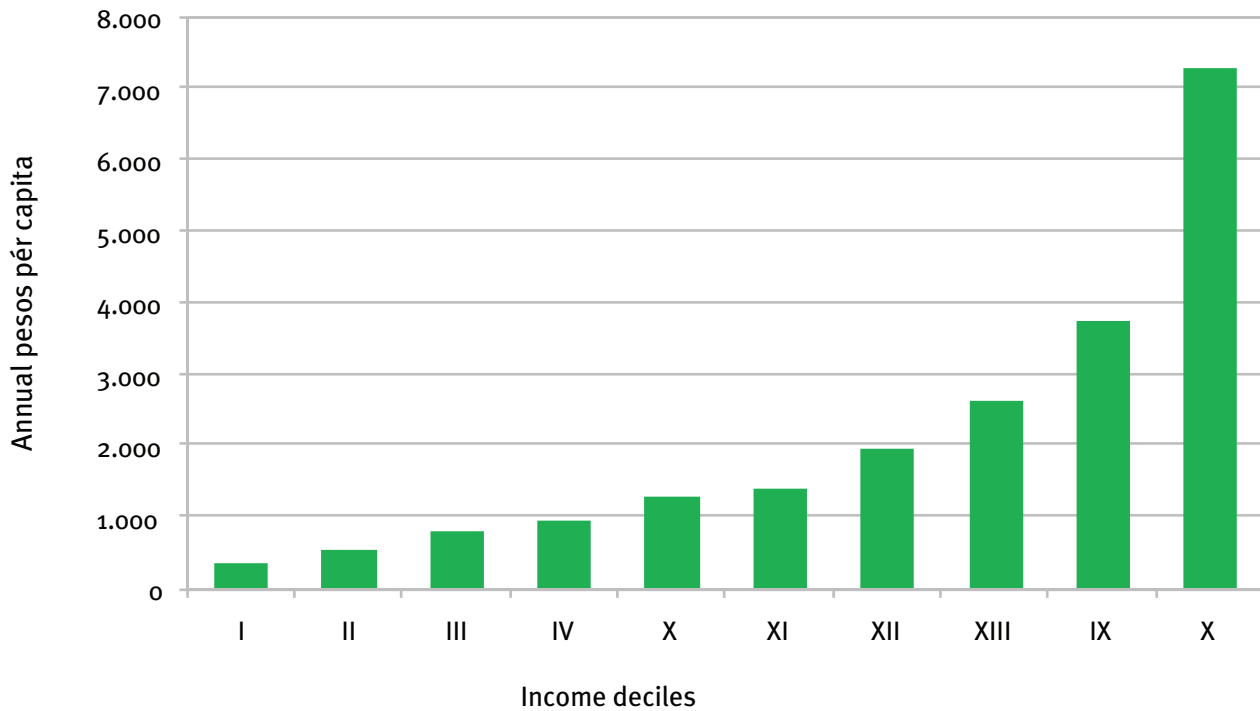
The Organisation for Economic Co-operation and Development (OECD) has pointed out that maintaining this subsidy is inefficient and exacerbates inequality among the country's population. The OECD points out that in terms of efficient spending, the regressive cost of the energy subsidies during 2008 was “twice that of poverty-combatting programmes and 1.4 times the health budget” (OECD, 2009a).

Scott (2010)'s research agreed with the OECD conclusion, indicating that the subsidy, implemented as part of the counter-cyclical measures generated by the world financial crisis in 2008, “far from supporting those most in need [...], 70% of this subsidy is concentrated on the richest third of the population, and barely 3.5% benefits the 20% most poor.”(Scott, 2010:23). In Graph 4 shows the benefits of this subsidy are primarily felt by the highest income deciles, while the poorest are neglected.

⁶ According to Reyes (2011) this amount corresponds to the gross transference from Art. 2-A, fr. I of the IEPS, which includes diesel.

⁷ Official estimate to the fourth quarter of 2011 (SHCP, 2011)

**GRAPH 4: GAS SUBSIDY AND INCOME DECILES, 2010
(ANNUAL PESOS PER CAPITA)**



Source: Scott, 2011.

BOX 4: TAX ON GASOLINE-INDUCED CARBON EMISSIONS

For the purpose of reducing automobile emissions, it is possible for a special tax on gasoline to be levied, as there already is a direct relationship between litres consumed and the resulting CO₂ emissions. The application of this economic instrument promotes reduced use of the automobile, increased purchases of energy efficient automobiles, and the use of public transportation, bicycles, travelling by foot and other more sustainable and economical modes of transport. Taxing greenhouse gas emissions also encourages the reduction of these emissions. Examples of similar taxes are found in Germany, Finland, Norway, among others (Sumner, 2009).

British Columbia, Canada is an example of a successful tax on carbon emissions from gasoline. Since 2008, British Columbia has collected \$10 Can. Dlls. (CAD) a ton, with an annual increase of 5 CAD to reach 30 CAD per ton of CO₂. In 2008 it collected 306 million Canadian Dollars in taxes and this figure will increase to 955 million by 2012. It is estimated that this tax will generate reductions of 3 million tons per annum of CO₂ by 2020 (Sumner, 2009).

Since the tax was implemented in 2008, it has generated a tax per litre of gasoline of 2.33 Canadian cents in 2008, which will climb up to 6.99 cents in 2012 (Litman, 2010).

BOX 5: RECURRENT TAX ON EMISSIONS IN THE UNITED KINGDOM

Various countries levy an annual tax on use or ownership of motor vehicles as a function of some environmental parameter (see OECD, 2009b). Said tax is generally calculated via grams of carbon dioxide per kilometre (gCO₂/km), which has a direct relationship to the car's yield (kilometres per litre).

A tax of this type is an incentive for purchasing and using automobiles that are more energy efficient, as by consuming less gasoline, fewer polluting emissions are generated. At the same time, it discourages the purchase of automobiles with high carbon emissions.

England levies an annual tax on cars as a function of the level of their carbon emissions, with rates that vary between £115 and £1,000 (\$2,194 and \$19,079 Pesos) for the first year and £20 to £460 (\$381 and 8,776 Pesos) for subsequent years. It is estimated that this tax helped to reduce total vehicle fleet emissions by 7.8% between 2000 and 2009, and reduced new car emissions by 17.4% during the same period (SMMT, 2011).

2.2.2 Elimination of the Car Ownership Tax at the Federal Level

The car ownership tax in Mexico was first instituted in 1962⁸ to tax the purchase and annual ownership of private cars. Although not intended specifically, the ownership tax has an environmental component because it dissuades the purchase of vehicles by increasing their value.

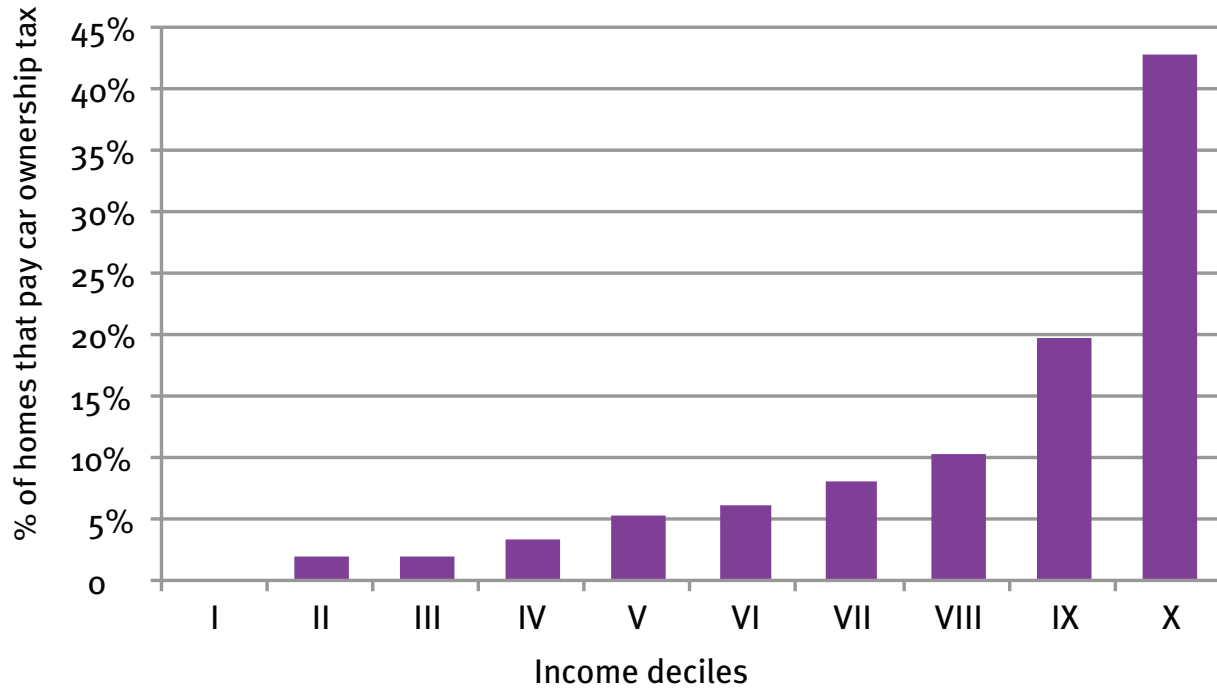
The car ownership tax is progressive, where the highest tax falls is on the automobiles that are the most costly, which also tends to belong to the households in the highest income brackets. 73% of the total tax revenue is from the top 30% income bracket. Meanwhile, 30% of the lowest income households contribute only 4.4% of this car ownership tax collection (SHCP, 2008). During 2010 said tax drew in 21,067.9 million Pesos.

This levy is not perfect in environmental terms, as it only is applied for the first 10 years of a vehicle's life span. As such, it encourages the use of older vehicles, which tend to be less energy efficient and pollute the most. Besides, it contains an incentive for use, as the more a car is used, the less the tax costs per kilometre travelled.

The tax also had the additional benefit of strengthening tax collection procedures and fortifying the authority of the states' collection agencies. is totally reintegrated by the federation into the local coffers and if it is applied well it is difficult to evade.

⁸ The car ownership tax was not created to finance the Olympics in 1968, as popular lore suggests. It was created first as part of the 1962 Income Tax Law (published in December of 1961) and later as a law in its own right: on December 28, 1962. The acceptance of Mexico City as host to the Olympic Games did not occur until October, 1963, when the 60th reunion of the International Olympic Committee took place in the city of Baden-Baden in Germany. (Esquivel, 2011)

GRAPH 5: PERCENTAGE PARTICIPATION OF CAR OWNERSHIP TAX PAYMENT IN MEXICAN HOMES (2008)



Source: SHCP, 2008.

The tax was eliminated as of January 1, 2012. Furthermore, states have granted a subsidy on car ownership for the majority of the vehicles in circulation (Montes and Cortés, 2012), and these two measures create even more vehicle ownership, as it reduces the purchasing cost and the annual ownership cost. Given that the biggest stimulus for using a car is owning one, this will result in an increased use of cars in the country. There will be more negative impacts at the state level, including reduced income and lower financial autonomy.

2.2.3 Mandatory Insurance

If the majority of motorists do not pay for third party civil liability insurance⁹, they underestimate the risks of driving by not having immediate parameters for evaluating their actions. This generates enormous public health-related costs because of the high indices of accidents that occur in cities and highways throughout the country.¹⁰ Between 55% and 60% of the cars in the country have no insurance at all (CESVI, 2011) and it is calculated that the cost of accidents in Mexico is equivalent to 126 billion Pesos a year, which represents 1.3% of national GDP (Ministry of Health 2008, and Cervantes, 2009).

At the same time, the insurance system currently in place has no incentives for being a cautious driver. Insurance is paid after an accident occurs, not upon purchase of the car or as a preventative measure (Vikrey, 1968).

⁹ Only the Federal District has a policy on mandatory insurance.

¹⁰ The high number of road accidents in Mexico is also related to the lack of a national policy that obliges one to take a driving test to obtain a driver's license in all the States in the Republic. The Economist (2011) points out that in 14 states in the country it is possible to obtain a license without having taken a driving test.

One alternative is the creation of an insurance system where premiums are calculated by kilometres travelled¹¹ ; a financial instrument of this type creates the necessary incentives to seek out alternatives to car use (see Box 6). As a result of the lack of mandatory insurance and of its implementation at present, there continues to be an incentive for cars to be overused and the probabilities of there being further automobile accidents are multiplied.

BOX 6: INSURANCE PER KILOMETRE

With this type of insurance the premium is calculated on the basis of the distance travelled during the term of the policy. This strategy bases the price of the insurance on the likelihood of the drivers being involved in an accident. The basic calculation is: the more kilometres travelled, the higher the probability of being involved in an accident and, therefore, the insurance is “used” more. Thus, drivers who travel over greater distances will pay higher premiums and those who cut down on their kilometres travelled may save money.

This instrument is an incentive for reducing car use and as such it helps to reduce traffic, the incidence of accidents, the consumption of fuel and the polluting emissions. In turn, it promotes a change towards sustainable transport models such as shared driving, public transportation, cycling and walking. It also promotes greater economic efficiency as it shows drivers the real costs they impose on society and allows them to reduce same and to save money. Additionally, it benefits the motorists in low income brackets who drive less kilometres and therefore will be paying for less expensive and more accessible vehicle insurance.

In spite of its benefits, this type of insurance has only been implemented in Japan, South Africa, the United Kingdom, Spain, Holland, Italy, Belgium, Canada and Israel. And in the United States, it is permitted by the laws in the states of Texas, Alabama, Kentucky, Louisiana, Maryland, Michigan, Colorado, Illinois, Ohio, Minnesota, Nueva Jersey, Oregon and California.

In California, this type of insurance was approved as of 2010. One of the largest insurance companies (Auto Club of Southern California) states that over 80% of its clients have switched to this service and they expect this number to reach 90% in the medium term. Another insurance company, State Farm, estimated that the savings for drivers in switching payment schemes would ascend to over 31 million Dollars (Vock 2011).

There is as yet no concrete data on the VKT reduction produced by this insurance. However, a study by the Environmental Protection Agency (Harvey and Deakin 1998) estimates that a fee of 2 cents per mile applied in the city of Los Angeles would reduce the VKT by 4.3% and trips by 4.1%. Trip times would be reduced by 6.4% and delays by 10.5%, while gasoline consumed and the CO₂ produced would decrease by 5.2%.

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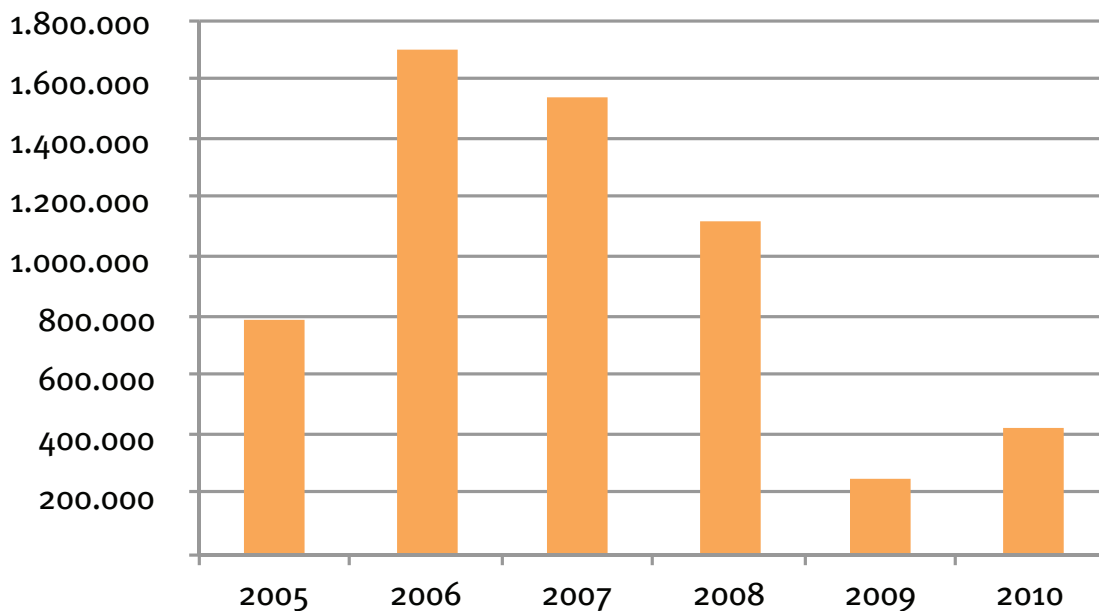
Another alternative is to use licenses by points at the national level as a means to encourage safe driving practices and road safety.

2.2.4 Open Trade

Since the signing of the North American Free Trade Agreement (NAFTA), Mexico has been importing used cars from the United States. All restrictions against the importation of 10-15 year old cars were lifted in 2005, and it subsequently has allowed 2.5 million private used cars to enter Mexico. This represents a small fraction of the vehicle fleet in circulation in the U.S. (232 million in 2005), but a significant percentage of the vehicles in circulation in Mexico (22 million in 2005).¹²

On March 18, 2008, the restrictions on importing of 11-15 year old used cars were established and a limit on imports of vehicles up to the age of 10 years old and younger. Special taxes were also increased on imported used cars from 3% to 15%. However, these limitations have not been completely successful, as imports have continued because of the legal protection against customs dispositions. According to the National Automobile Dealers Association (NADA, 2011b), some 6 million used vehicles have been imported from the United States from 2005 to 2010.

GRAPH 6: USED CARS IMPORTED FROM THE UNITED STATES, 2005-2010 (Cars)



Source: NADA, with information from the General Customs Administration.

As liberalisation of trade continues, all restrictions on vehicle importation will be eliminated by 2019, and the vehicle fleet will continue to grow¹³. This will lead to an increase in all the negative externalities from car use mentioned previously (Davis and Kahn, 2008).

¹² For further references see Davis and Kahn (2008).

¹³ NAFTA establishes that as of 2011 the restriction on importing cars up to eight years old will be reduced. On July 1st, 2011, the decree was published whereby said cars are allowed in without a certificate of origin. Open trade continues by stages: in 2013 cars up to seven years old will be allowed in without paying customs duties, in 2015 cars up to five years old, and by 2019 all restrictions will have been lifted.

2.2.5 Financial Policy: Automotive and Mortgage Credit

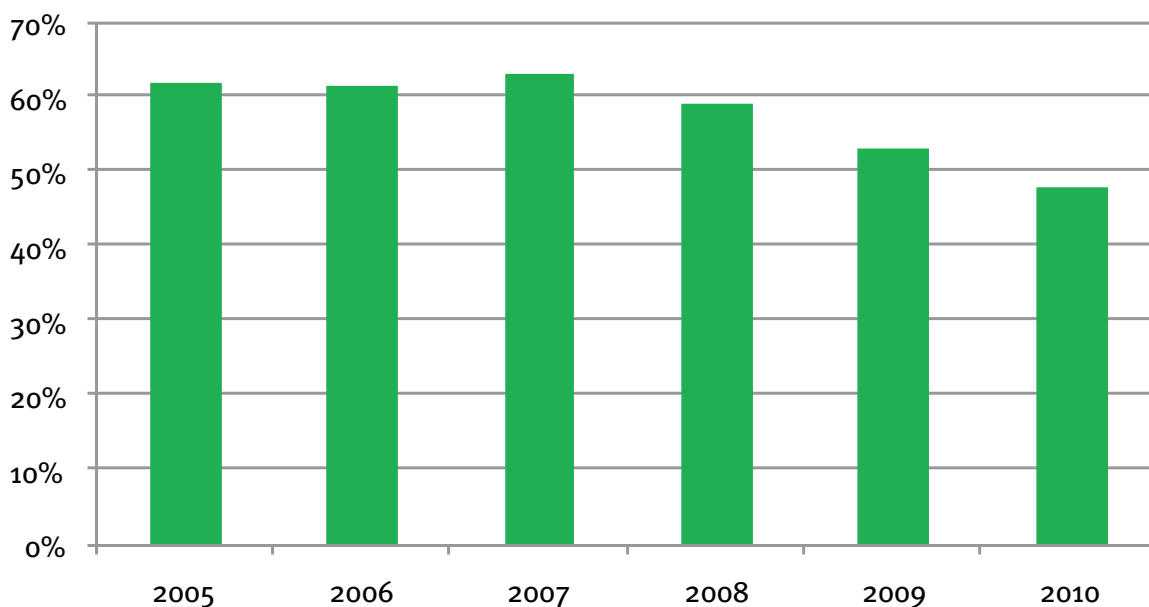
Policies must be put in place that encourage sustainable urban development and mobility. However, today's policies are encouraging the use of automobiles by easy automotive and mortgage options which facilitate the acquisition of cars and promotes the creation of cities that are reliant on car use.

2.2.5.1 Automotive Credit

The appearance of specialised non-bank financial intermediaries (Multiple Purpose Financial Institutions, or SOFOMES), the securitisation of automotive credits and the increase in competition in the financial sector have generated more competition among clients and a greater disposition of funds that are reflected in an attractive offering (of payments and interest rates) of automotive credits (CTS-INE, 2010).

The result has been an increase in the country's vehicle fleet. According to AMDA (2011a), between 2005-2010, 58% of new cars were purchased through automotive credits, which added 3.5 million to the vehicle fleet (*see Graph 7*). The acquisition of new cars per se is not detrimental; however, the lack of countermeasures that force the social costs of increased car use on the users themselves, make this unfavorable.

GRAPH 7: PERCENTAGE OF CAR SALES WITH FINANCING IN MEXICO, 2005-2010



Source: NADA, 2011.

BOX 7: MORTGAGE CREDITS WITH EFFICIENT LOCATION

Efficient location mortgage credits are credits for the acquisition of housing that increase the amount of the loan taking into account the savings derived from living in an area having services close by and easy access to public transportation, instead of driving a private car.

These mortgages have been used in the United States. They were driven by the Natural Resources Defense Council, the Surface Transportation Policy Project and the Center for Neighborhood Technology, with the backing of Fannie Mae, a government organism for the financing of housing.

Pilot programmes were implemented in Seattle, Chicago, San Francisco, Los Angeles, Minneapolis-St. Paul and Boston.

Rauterkus, Thrall and Hangen (2010) have demonstrated that the probability of mortgage non-payment increases with car ownership. Meanwhile, people whose homes are located in neighbourhoods offering easy accessibility to goods and services on foot are less likely to lag behind on payments.

This evidence points to the importance of location, accessibility and transportation in the granting of public financing for the acquisition of housing. Otherwise the purchasing families are subjected to heavy financial loads, due to transport costs, that can lead to non-payment of their mortgages.

This situation has been acknowledged in the document entitled “The State of Housing in Mexico 2011” (CIDOC and SHF, 2011); in mentioning the distance of the housing developments as a factor that explains why 21% of said housing has been abandoned.

Because of this, an instrument of this type may well be successful in repopulating the centric areas of the cities in the country and contributing to restoring their historic centres.

2.2.5.2 Mortgage Credit

The case of mortgage credit is very similar to the automotive credit mentioned previously. The policies for transforming public housing organisms into financing entities (CIDOC and SHF, 2011), the emergence of non-bank financial intermediaries, the channelling of public housing funds through other intermediaries and the securitisation of mortgages have resulted in considerable growth in the construction of housing in the country (*see Graph 8*).

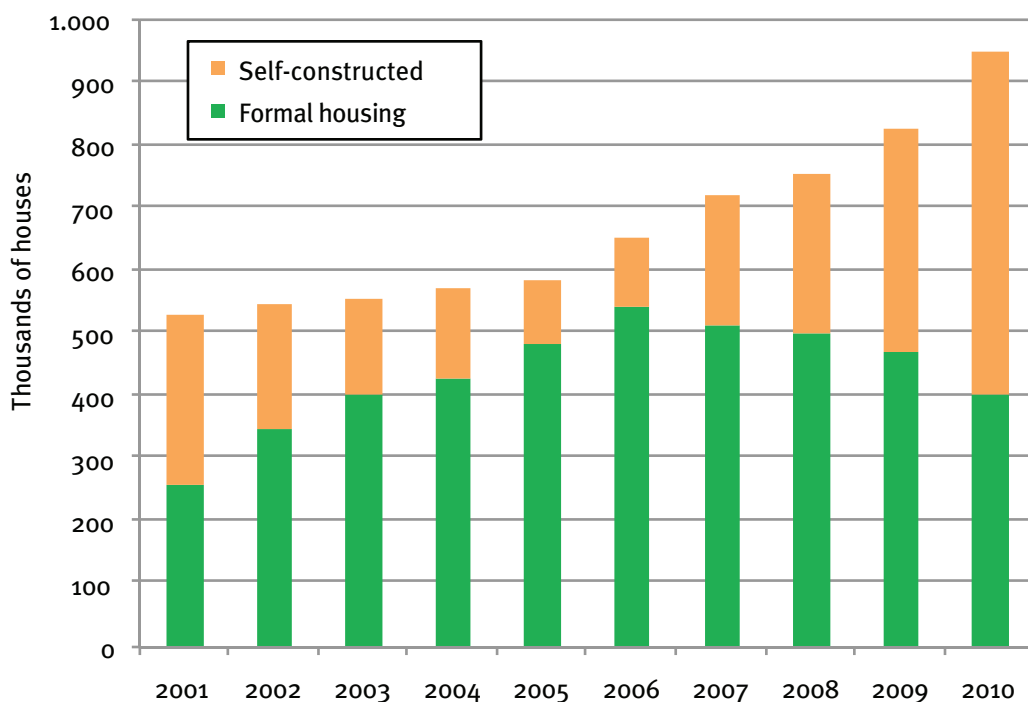
An example of this growth is the fact that in only seven years (2003-2010) the National Workers Housing Fund Institute (INFONAVIT) granted more credits (a little more than 3.2 million) than what it had allotted in the 30 years prior (IMCO, 2011).

These financial developments and the housing policies are orienting cities towards, in the medium term, auto-dependent forms because for the most part, the social housing complexes are built on the urban fringe. However, 26% of the houses financed by the INFONAVIT are currently vacant, their distance from the city being the reason for 21% of them having been abandoned (INFONAVIT, 2010).

The Current State of Housing in Mexico 2010 (CIDOC and SHF, 2010) reports that: accelerated and disorderly growth of the sector, dissociation of public policy in the three branches of government, distortions in the market that increase the price of land, and the persistent distancing of new housing developments from the city centres “complicates the resourcing of urban infrastructure and basic services, which in turn has negative repercussions on the population, as it increases costs and commuting times”.

The following year, the diagnosis of *The Current State of Housing in Mexico 2011* (CIDOC and SHF, 2011) points to conclusions similar to those of the preceding year: “The financial infrastructure [of housing] gave priority orientation of its resources towards solutions that create distortions in the housing market. In stimulating a greater credit offering for the acquisition of single family housing (mainly new), it propitiated greater demand for land, basic urban services, transport and means of communication, which required local governments to make ever larger investments in infrastructure and meant large cities continued to grow more than was desirable. The lack of a countermeasure on the part of the State – to guide and incite orderly urban growth – generated a lag in attention to services, in light of a growing yet anarchical housing market.”

GRAPH 8: GROWTH OF THE HOUSING OFFERING, 2001-2010 (thousands of houses)



Source: Towle, 2011.

Namely, these new, housing developments have been created outside city limits and not even within the existing urban sprawl, where all urban services are to be found, including transport. This has made the inhabitants reliant cars.

Duhau (2008) reported that three quarters of the heads of families in a housing complex in San Buenaventura, Ixtapaluca, Estado de México, commuted to work in their own cars, putting in two to four hours a day in transit time.¹⁴

BOX 8: HIGH INCOME URBAN DEVELOPMENTS THAT PROMOTES CAR USE

Construction on city's outskirts high-income housing developments, corporate offices, large shopping centers, tourist centers and educational facilities promotes car use. Not only are they are major generators of trips that attract many people to them, but also because they are often designed to accommodate the automobile as the primary means of transportation, whether by its remote location in relation to public transport services or for their approach to high income population segments or for their substantial areas designated to serve as parking lots or avenues that lower car use costs as in some Mexican municipalities. Similarly, due to its configuration of these developments, they boost spatial segregation in cities.

An example of this type of development is the Santa Fe development that was built in the west of Mexico City. Planned by local government and real estate developers (Pérez, 2010), it was built away from downtown in an area with poor provision of public transport and services, and with a lot of car parking. Its urban fabric discourages use of public transport and non-motorized transport modes (Pérez, 2010) and because of its focus to a high-income market (Valenzuela, 2007), automobile is the dominant form of transportation.

These developments resemble the suburbs of the United States that are heavily car-dependent as a means of transport. In Mexico these kind of developments are not the norm, but are beginning to grow. High-income residential area and commercial premises are being built in the municipality of Huixquilucan, State of Mexico, Lerma municipality or Punta Norte Outlet, and the municipality of Zapopan or the Forest of Spring in the metropolitan area of Guadalajara.

Although this is an issue of local governance, the lack of national guidelines for urban development allows the expansion of cities in unsustainable ways.

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The risk goes well beyond merely creating cities that are very reliant on car use. This policy also holds severe risks for the financial and macroeconomic stability of the country, as has been demonstrated by the subprime mortgage crisis in the U.S. in 2007, if the adequate financial and economic precautions are not taken. Likewise, there is also the risk of generating greater social segregation, which does not contribute to the building of a tolerant civil society or to the creation of democratic institutions, elements that are a barrier to problems of insecurity in the country.

2.2.6 Public Transport Expenditure

Public spending has focused heavily on car use. The trends in types of investment in public works generally prioritize automobile infrastructure rather than investment in public transport and non-motorised mobility.

In 2011, 66% of the total resources earmarked for public works, which is equivalent to 8,513 million Pesos, went to automobile infrastructure. In comparison, 2,834 million Pesos was allocated to public space, public transport and cycling infrastructure, which is 22% of the total.¹⁵ However, if the funds dedicated to the construction of Line 12 of the subway is taken out of the 2,834 million Pesos, the amount allocated to public space and cycling infrastructure is only 0.31% of the total.

The federal government also grants different budgetary resources to state and local governments for infrastructure for mobility and accessibility.¹⁶ However, this has typically been allocated to increased the focus of this expenditure has also been to afford facilities for car use as well.

BOX 9: PARKING METERS FOR REDUCING CAR USE AND GENERATING LOCAL INCOME

Parking meters discourage the use of cars and thereby reduce traffic, smog, noise and other externalities. Similarly, they have the advantage of generating income for local governments that could be sufficient for financing diverse urban projects.

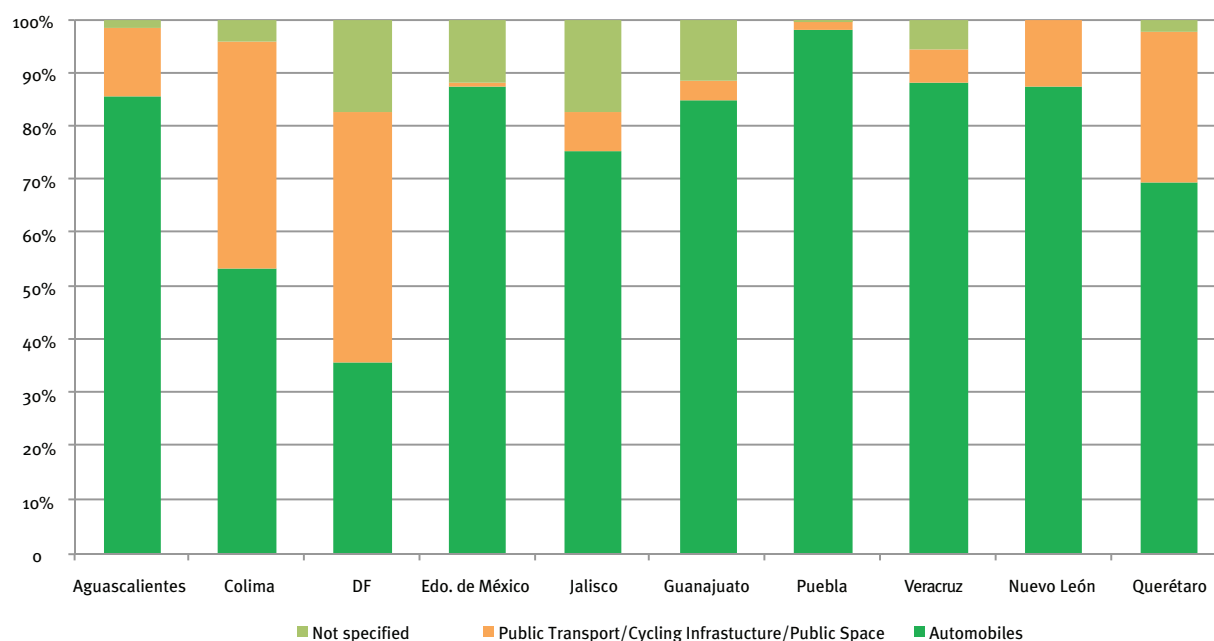
For example, in the city of Westminster, in London, more money comes in through parking meters than through the home ownership tax (Shoup, 2010). These takings have been paid back to the community in the following manner: 40% for public transport and infrastructure; 28% for improvements to and maintenance of streets; 26% for community services and education for children; 5% for support services (such as paying for public transport for the elderly and disabled), and 1% for urban development (Westminster City Council, 2010).

The Federal District today has a parking meter programme in place that contemplates earmarking 30% of these takings to improving public space.

¹⁵ For a detailed explanation of these figures see Garduño (2012).

¹⁶ Fondo Metropolitano, Fondo de Pavimentación a Municipios (FOPAM); Programas y Fondos Regionales (ramo 23); Fondo de Aportaciones para el Fortalecimiento de las Entidades Federativas (FAFEF); Fondo de Aportaciones para el Fortalecimiento de los Municipios y de las Demarcaciones Territoriales del Distrito Federal (FORTAMUNDF); Fondo de Aportaciones para la Infraestructura Social (FAIS); HABITAT programmes; Recovery of Public Spaces, as well as the Reassignment and Decentralisation Agreements.

GRAPH 9: DISTRIBUTION OF TRANSPORT SPENDING IN TEN MEXICAN STATES, 2011 (percentages)



Source: ITDP México, with data from the SHCP.

The Fondo Metropolitano (Metropolitan Fund) is one of these funds, and finances the execution of studies, programmes, projects, works of infrastructure and equipment for municipalities to increase their competitiveness and economic productivity, mitigate their vulnerability vis-à-vis natural phenomena and encourage the consolidation of the metropolitan area and its advantages.

Between 2006 and 2010 this Fund financed 334 projects totalling 22.3 billion Pesos. The remaining 52% of the resources were channelled towards 197 projects of road infrastructure– focused, primarily, on cars. The Fund only financed 9 projects for public transportation, using 17% of its resources. The rest was used for water and other projects. This is a clear example of public spending in favour of motor vehicle transportation (Orozco and Palmerín, 2011).

CHART 2: PROJECTS BY SECTOR FOR DIFFERENT METROPOLITAN AREAS, 2008- 2010

	AUTOMOBILE	PUBLIC TRANSPORTATION	WATER	OTHERS
ZMVM	50	7	41	21
Guadalajara	31	0	1	1
Monterrey	28	0	0	4
León	11	0	5	6
Puebla	24	0	8	7
La Laguna	47	1	9	6
Querétaro	6	1	3	16
TOTAL	197	9	67	61

Source: ITDP México, with data from the SHCP.

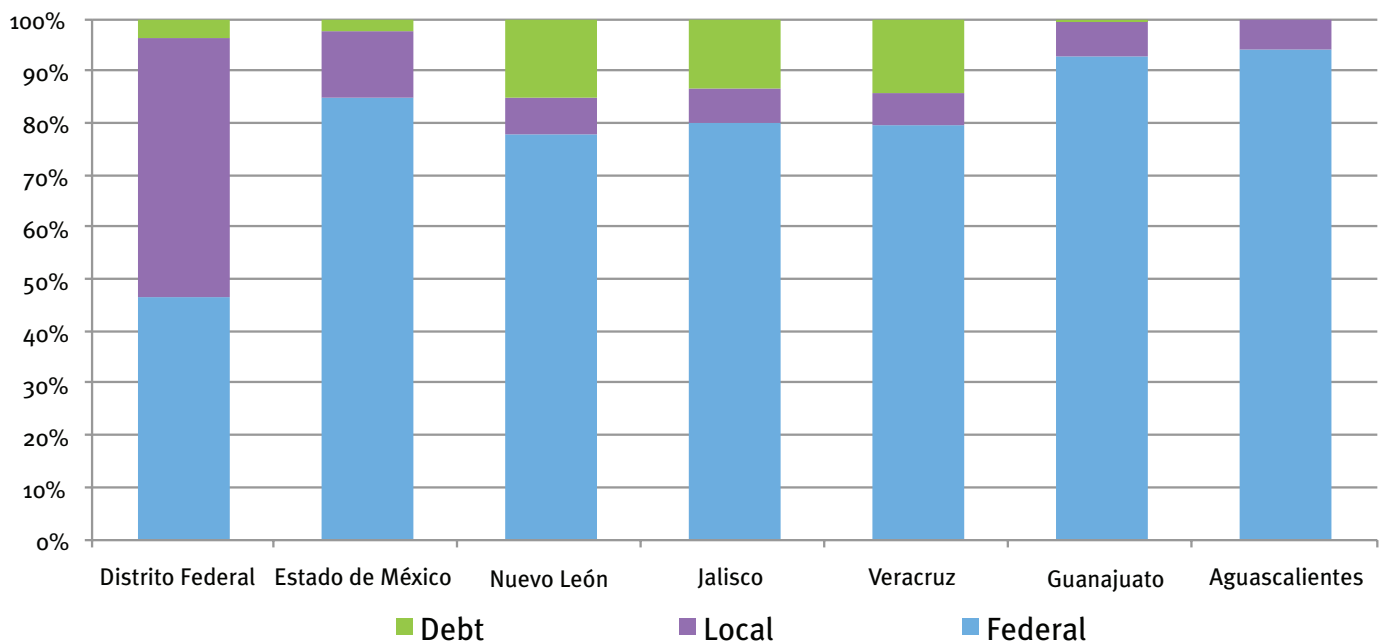
2.3 Institutional Structure

The success of any public policy depends on the institutional structures responsible for designing, implementing and evaluating it. In Mexico there is no organism at the national level responsible for coordinating sustainable urban mobility (UN-HABITAT, 2011), or for generating data on car use. At the federal level, neither the Ministry of Communications and Transportation nor the Ministry of Social Development have mandates or institutional structures capable of driving and improving urban mobility. The topic as such is treated tangentially, in spite of its economic and social importance, given that 77% of Mexico's population is urban.

At the local level there are authorities supposedly responsible for this (ministries of road administration, of transport or of the environment), but often these lack technical, financial and human resource capabilities.

The short 3 year term of municipal presidents complicates the medium to long term planning of mobility. The autonomy of state authorities is also quite limited, as they depend financially on the federal government to make investments in matters of urban mobility (see *Graph 10*).

GRAPH 10: PERCENTAGE DISTRIBUTION OF STATE RESOURCES BY ORIGIN



Source: ITDP based on Cuentas Públicas Estatales 2010 (Public State Accounts).

Coordinating the branches of government represents an enormous effort. Article 115 of the Political Constitution of the United Mexican States establishes that a of the municipalities is public transport and urban development. This mandate limits the Federation and the states when they happen to share the responsibility, as their direct involvement in said topics and the respective decision-making often lead to interminable disputes over their ‘competencies’. This same problem is further aggravated in Mexico’s metropolitan areas, in which different orders of government intervene in a single city, where there are no mechanisms in place to ensure their coordination for the solving of their problems.

The generating, gathering, centralising and disseminating of official information on car use at the urban and national level is scarce in the best of cases and non-existent in the worst. Mexico also lacks a legal mandate, organism or institutional structure charged with generating data or gathering the scarce information contributed by the authorities in the cities and metropolitan areas in the country on car use, or with disseminating said data.¹⁷

The lack of transparency at the state level makes it difficult to know how local income and federal participations are being spent¹⁸ on infrastructure. This has been amply documented (CIDAC, 2011).

In the last two decades, the State has abandoned urban planning in favour of free market “invisible hand” models of planning. Because of this, urban and territorial planning in Mexico has been neglected, to the extent that during the government administration of 2006-2012 no National Urban Development Programme was published. The 2000-2006 programme is still in force (UN-HABITAT, 2011), but in light of the constant changes in the urban phenomenon, it is evident that it has not been updated to confront today’s challenges.

The lack of a guiding programme at the national level has undoubtedly contributed to the disorderly growth of the cities.

BOX 10: MECHANISMS FOR METROPOLITAN PLANNING AND COORDINATION: MUNICIPAL PLANNING INSTITUTES AND METROPOLITAN FUND

In spite of the limited government mandates of the municipalities that hinders long term urban planning, some have found an answer in the creation of Municipal Planning Institutes (MPIs). These are institutional instruments that allow for the designing and implementing of urban development plans, and thereby the aligning of local urban planning and housing regulations. Usually the MPIs are decentralised public organisms, managed autonomously and directed by a citizen council that promotes and coordinates integrated municipal development. This allows them to have medium and long term objectives in their planning (Olvera and Quiñones, 2007). At present there are 38 institutes of this type in the country.

In the case of the metropolitan coordination, the federal financing can be a very useful tool in generating the incentives for coordination between different entities and levels of government. An example of this is the Metropolitan Fund (FM) which, through its financing for public and other infrastructure, provides incentives for the different branches of government in a metropolitan area to be coordinated for the purpose of accessing and exercising said funds.

¹⁷ If the information on a phenomenon is not collected or generated, drawing up a precise diagnosis is impossible to do, and it becomes even more difficult to take measures for resolving the matter. Worse yet, it is impossible to monitor and evaluate the policies implemented.

¹⁸ It is important to point out that the federal participations form part of the local tax collection agencies in the states, so they are not auditable by the Federation either, and, generally, their assignment is not very transparent.

The operating rules of the MF require that the state governments that converge in a given metropolitan area make the request jointly. Once approved, they are obligated to create a Council for Metropolitan Development, which will be the entity responsible for deciding on how to assign and apply the resources. This Council will facilitate the dialogue between the responsible state authorities and delegations or municipalities that make up the benefited metropolitan area, as well as all the instances of public, social and private spheres that contribute elements for decision-making purposes. The operating rules suggest using the funds assigned on the creation of a metropolitan development plan or using the resources for the state and municipal Development Plans in force. For 2011 this Fund had \$7,846.3 million Pesos with which to benefit 47 metropolitan areas (Orozco and Palmerín, 2011).

BOX 11: INSTITUTIONAL STRUCTURE IN THE UNITED KINGDOM

The United Kingdom has the Department for Transport, an institution with jurisdiction in Great Britain and limited powers in Wales, Scotland and Northern Ireland. It is responsible for ensuring the transport systems have sustained economic growth and productivity through reliable and efficient networks; improving the environmental yield of transport; fortifying the safety of the transport modes themselves, and improving accessibility to jobs, services and social networks, including the most disadvantaged.

This institution dictates the strategic guidelines for the transport services, which are rendered through a wide range of public and private sector organisms, including their own executive agencies. Likewise, the law obliges the local authorities to create, maintain and update a Transport Plan every five years with objectives, goals and periodic evaluations. The department provides support, and generates signposts and guidelines for their creation and implementation.

In like fashion, this organism drives public policies in matters of transport for the local authorities and is in charge of contributing to the financing of same for the development of local transport services and improving and maintaining their infrastructure.

On the other hand, in 1994 the United Kingdom implemented an on-going programme which established the importance of encouraging the use of public transport and reducing, in concert, reliance on the car, acknowledging that quality of life for its inhabitants depends on transportation and on easy accessibility to both places of work and areas for shopping, leisure and other services. To that end they issued their “Note to Planning Policy Guidance 13, Transport” in 1994, modified by “A New Deal for Trunk Roads in England: Understanding the New Approach to Appraisal” (July, 1998), in what was conceived in 2000 as “Transport 2010, the ten-year plan”.

The objectives of these integrated transport planning policies in the United Kingdom, at the national, regional, strategic and local level, are:

- Promote more sustainable transport options for people and for moving cargo
- Promote accessibility to jobs, shopping, leisure and public services by means of the use of public transport, walking and cycling, and
- Reduce the need to travel by car, considering that this transport mode will carry on having an important role for some journeys, above all in rural areas, where it will continue to be the only real option available.

2.4 Economic, Environmental and Social Costs of Automobile Use in Mexico

Excessive car use in Mexican cities is costing its inhabitants and the country dearly. Ignored by public policies, the costs are not included in environmental or urban impact assessments or cost-benefit analyses. The impacts can be divided into: economic, environmental, and social.

2.4.1 Economic Costs

The principal economic impact of car use centres on the subsidization of gasoline. Current policy fixes the price of gasoline rather than adjusting it to international market prices¹⁹. During 2010 this translated into a subsidy of 76.6 billion Pesos (Reyes, 2011).

This subsidized pricing encourages the import of more gasoline, which makes up 47% of overall fuel consumption in Mexico²⁰. Motorists, the largest consumers of gasoline in the country (Galindo and Catalán, 2008), end up being the principal beneficiaries of this price control that ends up being a regressive subsidy, due to the fact that car ownership is concentrated in the richest homes in the country.

This regressive subsidy contributes to the erosion of public finances, detracting resources from important social programmes and public investments intended to increase the well-being and economic development of the country.

In 2010 alone, subsidies on gasoline imports (Mexico's principal imported product) cost the country 148 million Pesos of public funds; by November of 2011 the figure had climbed to 218 million Pesos.²¹ This situation increases the trade deficit and contributes to the economic fragility of the country.²² Added to this, the gradual decline in the national production of oil²³ (García, 2011) may well create a reliance on energy from abroad and turn into a national security risk.

¹⁹ In Mexico the price of gasoline is established on the basis of the import price, plus adjustments determined by the Ministry of Finance and Public Credit, using a complex formula as a function of quality, handling, transport costs, Pemex's trade margin, and the Special Tax on Goods and Services (for further references, see Reyes, 2010).

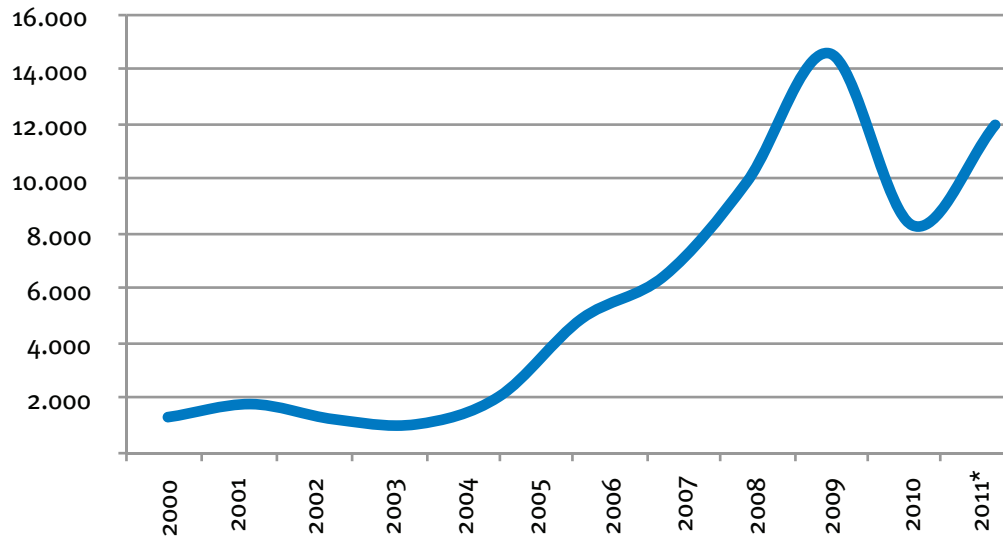
²⁰ According to Pemex's Oil Indicator data (2012), in 2010, 801 thousand barrels of gasoline were consumed a day and 378 thousand barrels imported a day.

²¹ Data based on Banxico (2012).

²² External fragility refers to the weakness of the economy vis-à-vis unforeseen events occurring abroad, such as the abrupt increase in oil prices, the collapse of financial markets, etc.

²³ The production of oil at its highest point in 2004 was 3.4 million barrels a day, decreasing to 2.5 million barrels a day in 2011 (PEMEX, 2012).

GRAPH 11: GASOLINE IMPORTS, 2000-2010 (millions of Dollars)



*Data through November, 2011.
Source: With data from Banco de México.

Severe traffic congestion also results in economic losses—the more time spent in traffic the less a worker is able to produce and the more it costs to transport merchandise. It is estimated that in Mexico road congestion generates losses of some 200 billion Pesos per annum (CTS, 2010). The Mexican Institute on Competitiveness cites this as a factor hindering Mexico City’s competitiveness, discouraging investments, and curbing its potential economic development (IMCO, 2011).

2.4.2 Environmental Costs

Cars generate 18% of greenhouse gas emissions (Galindo, 2009), a major contributor to global warming and impediment to Mexico’s development. It is estimated that global warming will generate losses of up to 6% of Mexico’s GDP in this century if no action is taken to adopt mitigating policies (Galindo, 2009).

On the other hand, more than 34 million people in urban areas are exposed to criteria pollutants²⁴ in the air, causing illness, low productivity, loss of quality of life, and deaths (INE, 2009). The World Health Organization (WHO) pointed out that there were 14,734 deaths associated with poor air quality in Mexico in 2008 alone.²⁵ In Mexico City it is estimated that local pollution causes 4,000 premature deaths and 2.5 million working days lost a year (INE, 2005).

2.4.3 Health and Social Costs

Road accidents cause 24,000 deaths, 40,000 handicapped and 750,000 wounded a year, which generate expenses of 126 billion Pesos per annum, equivalent to approximately 1.3% of the GDP (Ministry of Health, 2010b, and Cervantes, 2009).

Potentially, using a car for short-distance trips limits physical activity and contributes to the problem of obesity in the nation. It is worth mentioning that 70% of Mexicans are overweight or obese,

²⁴ The criteria pollutants are: particulate matter (PM), sulfur dioxide (SO_x), carbon monoxide (CO), nitrogen oxides (NO_x), volatile organic compounds (VOC) and ozone (O₃).

²⁵ Information from the WHO’s Global Health Observatory

and health-related problems represent an expense equivalent to 2% of GDP (National Public Health Institute, 2006).

Similarly, the socio-spatial segregation²⁶, generated by developments and infrastructure for private cars, and intense car use, contribute to the breakdown of social bonding (Appleyard, 1981; Hart, 2008). As a result, social exclusion (anomia)²⁷ in the city has increased, socialising has deteriorated, and tolerance among people has declined. This has serious consequences for the building of democratic, unified, competitive societies with high standards of living (Florida, *et al.* 2008).

2.4.4 Estimate of Negative Externalities at the Urban Level in Mexico²⁸

Data measuring the cost of five externalities associated with car use (accidents, congestion, local pollution, noise, and greenhouse gases) for five metropolitan areas in Mexico indicate that the country pays a high price for private car use. The metropolitan areas of the Valley of Mexico, Guadalajara, Monterrey, Puebla-Tlaxcala, and León represent 42% of Mexico's urban population and 40% of the nation's private vehicle fleet. The combined cost of those five externalities in these areas is estimated at 173 billion Pesos, or 4% of total GDP. The highest cost is represented by traffic congestion (61%), followed by accidents (13.7%), local pollution (12.1%), noise (7%), and greenhouse gas emissions (5.7%).

It is worth noting that these estimates do not take into consideration other social damages²⁹, such as, stress, the breakdown of social relationships, the consumption of space, the deterioration of public space, or the opportunity costs of earmarking resources for infrastructure or subsidising car use.

²⁶ According to Sabatini, Cáceres, and Gerda (2001:5), socio-spatial segregation is defined as “the degree of spatial proximity or territorial crowding of families belonging to the same social group, whether defined in terms of ethnic background, age, religious, or socioeconomic preference, among other possibilities.”

²⁷ Isuani (1999) mentions that the concept of anomia refers to the absence of rules that mediate the relationship between different parties in a society. Anomia reflects problems of social integration, of an increase in individualism, and an absence of containment in society. Separately, Waldmann (2003:11) points out that “a social situation is anomic when there is a lack of clear, consistent, sanctionable, and accepted, to a certain extent, rules on the part of society for directing social behaviour and providing guidance.”

²⁸ For a more detailed explanation of the estimates contained in this section see the study entitled “The importance of reduced car use in Mexico. Tendencies in car ownership, in car use and in their impacts.” (Medina, 2012).

²⁹ Data gathered by the World Bank (2002) points out that in cities such as Santiago, Buenos Aires and Mexico City, among others, the costs of externalities are greater than 5% of GDP.

**CHART 3: ESTIMATE OF EXTERNALITIES ASSOCIATED WITH CAR USE
IN SELECT METROPOLITAN AREAS IN MEXICO, 2009 (millions of Pesos)**

AREA	LOCAL SMOG	CLIMATE CHANGE	ACCIDENTS	CONGESTION	NOISE	TOTAL	% OF GDP
Valley of Mexico	14,396	6,718	10,332	82,163	8,320	121,930	4.6%
Monterrey	2,282	1,065	5,843	11,485	1,319	21,994	2.8%
Guadalajara	2,795	1,304	4,970	10,635	1,615	21,319	4.7%
Puebla-Tlaxcala	996	465	1,317	1,894	575	5,247	1.8%
León	506	236	1,250	321	293	2,606	1.6%
TOTAL	20,975	9,787	23,712	106,498	12,123	173,095	4.0%

Source: Medina, 2012.

3. Elements Necessary for a National Policy to Reduce Kilometres Travelled by Car

3.1 Management of Mobility

In order to successfully drive a federal policy on increasing transport system efficiency by reducing excessive car use and its negative impacts it is necessary to change the way transport problems in cities are conceptualized. The paradigm that focuses on a offering greater road infrastructure for improving vehicular flows is out of date. It is time to transform commuting habits and provide incentives for using public transport. In this way it will be possible to achieve public policy objectives (*see Illustration 1 and Box 12*) associated with the idea of “push and pull” trips—that is, pushing trips away from the private car and attracting or pulling them towards public transport and non-motorised transport modes; all of this for the purpose of managing urban mobility with a view to sustainability.

In this regard, management of mobility is to be understood as the set of strategies set up to change people’s travel behaviour (how, when, and where people travel) with the intention of increasing the efficiency of transportation systems and achieving specific public policy objectives towards sustainable development. The mobility management strategies give priority to the movement of people and goods above that of vehicles, and thus, towards efficient transport modes such as walking, cycling, public transport, working from home, sharing a car, etc. It is important to point out that mobility management includes among its objectives reducing reliance on car use, as this is the most costly and inefficient transport mode for society.

BOX 12: TRANSPORT PARADIGMS

Capacity Paradigm: This implies solving vehicle-related congestion problems by increasing the offering of roads by means of new infrastructure or using intelligent transport systems to increase the efficiency of the existing infrastructure. The effect of this strategy is to induce greater demand for use of the road infrastructure, resulting in more congestion in the medium and long term. These solutions are short term and benefit only motorists, and therefore are inequitable.

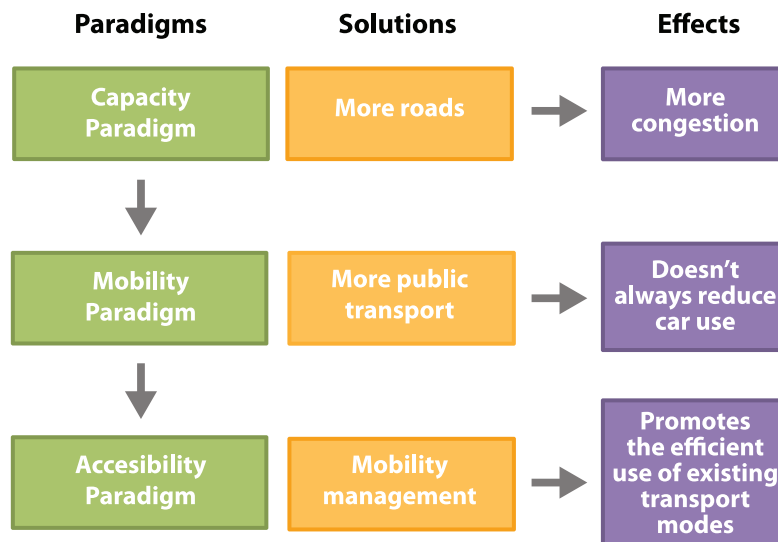
Mobility Paradigm: This paradigm is focused on moving people and goods in an efficient manner. It proposes using the capacity of roads intelligently and efficiently, and among other proposals considers public transport systems.

However, this paradigm assigns less value to “slower” modes of transport such as walking and cycling, and minimises the importance of strategies for managing demand (economic instruments, planning instruments, etc.) while ignoring the impact of the urban structure on mobility and the accessibility of people, which is why it is not considered an integrated solution.

Accessibility Paradigm: This places value on the level of multimode service, accessibility to a diversity of goods and services, and the reduction of the person-per trip costs. It encourages the development of compact cities and mixed-land uses that allow people to have most of their needs met over short distances.

Source: Adapted by ITDP y I-CE (2010)

ILLUSTRATION 1: URBAN MOBILITY PARADIGM EVOLUTION



Source: Mesa de Movilidad de Madrid.

Sustainable urban mobility is based on a reduction in car use. And this reduction can be measured, controlled, and evaluated by means of the vehicle-kilometre travelled indicator. This indicator is a good gauge of mobility (motorised individual) and a good indicator of the places where mobility management policies should be applied, as well as of how to assess the results of these measures in terms of reduced car use.

BOX 13: MOBILITY MANAGEMENT, NON-MOTORIZED AND PUBLIC TRANSPORT

Mobility Management also involves providing a wider choice of quality public transport and facilities for non-motorized transport (bicycles and walking). The aim is to create real alternatives to car use and thus to change the way the population moves in cities.

In the case of Mexico, public transport within cities is dominated by concession models known as “men-trucks” that do not constitute a real public transport system. This generates low-quality services that are not alternatives to car use. The situation for non-motorized transport is often similar; the conditions for bicycling or walking are not the most appropriate for these modes.

For these reasons, measures to promote sustainable mobility in Mexican cities involve either improving or creating services and infrastructure for public transport and non-motorized. Some necessary measures include: transformation of “man-trucks” into true transportation companies; create integrated services and multimodal transport; provide cycling infrastructure; improve pedestrian accessibility.

An example of successful transformation from services provided by man-truck to a structured public transport system is the BRT (Metrobus) in Mexico City. This has become a system of high quality public transport at a low investment cost, which also has high accessibility.

3.2 Integrated Mobility Management Measures

Enforcing a single type of measure, such as building more road infrastructure, does not reduce the negative externalities of car use, nor do solutions of using high-yield vehicles on their own. The latter even tend to aggravate issues of traffic safety, land use, and health (*see Chart 4*).

Various solutions need to be implemented in order to manage mobility and achieve real sustainable transport that benefits all of society. That is to say, mobility should be managed in an integrated manner, with specific objectives for reducing car use that eliminates its negative externalities. This includes implementing strategies that encourage a greater use of sustainable transport modes (with lower external costs being generated), improving and increasing the public and non-motorised transport offering, and using the available technological tools to diminish the impacts generated by car use.

CHART 4: BENEFITS OF THE DIFFERENT POLICIES ON MOBILITY

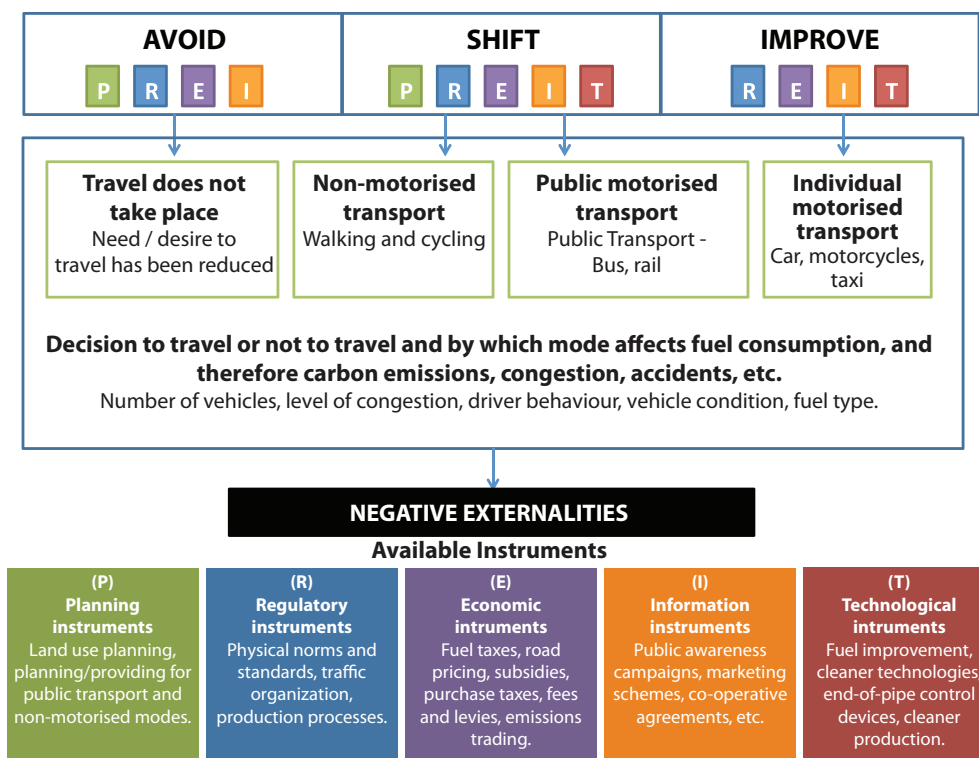
PLANNING OBJECTIVES	INCREASE IN ROADS	HIGH YIELD VEHICLES	MOBILITY MANAGEMENT
IMPACT ON CAR TRAVEL	INCREASES	INCREASES	REDUCES
Convenience and comfort	✓		✓
Reduced congestion	✓/short term ✗/long term	✗	✓
Savings in road and parking systems	✗	✗	✓
Savings for consumers		✓/ ✗	✓
Fewer accidents	✗	✗	✓
Improved mobility options			✓
Energy conservation	✗	✓	✓
Reduced pollution	✗	✓	✓
Improvements in health			✓
Economic development	?	?	✓
Land use objectives	✗	✗	✓

Note: (✓ = Achieves objective. ✗ = Contradicts objective). The expansion of streets and vehicles with greater yield provide benefits, but other problems are exacerbated when incentives to travel are offered. The mobility management strategies improve travel options and drive the use of sustainable and alternative travel modes, reducing car use, which contributes to achieving diverse planning objectives.

Source: Litman, 2009.

Dalkmann and Brannigan (2007) point out that in order to implement sustainable transport that promotes higher quality of life in cities three basic strategies need to be implemented: **avoiding**, **shifting**, and **improving** (see *Illustration 2*).³⁰

ILLUSTRATION 2: POTENTIAL STRATEGIES FOR REDUCING NEGATIVE EXTERNALITIES FROM TRANSPORT



Source: Adapted from Dalkmann and Brannigan (2007)

³⁰ It is worth pointing out that the Dalkmann and Brannigan (2007) focus was designed essentially for reducing carbon emissions from transport. However, it can be adapted for reducing all negative externalities from car use, if the diversity of instruments available is applied with a focus on reducing kilometres travelled by private car.

- **Avoid or reduce** the need to travel by private car. That is to say, “drive” the demand for travel away from the automobile. In order to achieve this, the existing instruments (see above) are applied to car use from its point of origin, during its journey, and at its destination.
- **Shift or encourage** more efficient transport modes such as non-motorised transport (walking or cycling) and public transport such as buses, BRT (bus rapid transit), subway or underground, among others. This can be done by improving and generating a greater offering of these transport modes or granting incentives for them, for the purpose of “attracting” travel to these transport modes. This is a fundamental strategy for reducing car use.
- **Improve** the performance of motorised transport, primarily that of private cars, but also that of public transport, to reduce negative externalities. While private cars will obviously not disappear or be phased out, they should be made to inflict the least possible damage on society by incorporating the best technologies and designs available to that end.

In order to implement these strategies, different instruments are available that can be classed as planning, regulatory, economic, information, and technological (*see Box 14*). The implementation of the strategies and their instruments generate four possible results that will determine the reduction of externalities from car use:

- Travel does not take place: as a result of the measures implemented, the decision is made to not make the journey by car. In this case the externalities from car use are reduced to zero. This is achieved via the **avoid** strategy.
- Non-motorised transport increases: the strategy of **shift the transport** mode results in a higher incidence of walking or cycling.
- Motorised public transport increases or is more efficient. A second result of the **shift** strategy is to have a trip by car changed to using public transport such as buses or other mass transit (BRT or subway). Due to the high occupancy of these modes, the negative externalities are lower per passenger when compared to a lone traveller in a car. The strategy of **improve** the technology and efficiency of these transport modes is also necessary for reducing polluting emissions and greenhouse gases.
- Motorised transport becomes more efficient. Should private cars and other motorised vehicles still be in use, the strategy of **improve**—in terms of energy efficiency and technology, or travel-related decisions, such as car pooling—helps to reduce pollution and/or traffic congestion.

The result and scale of personal travel decisions will in the end affect the level of negative externalities from car use (emissions, congestion, accidents, noise, etc.) as a function of the number of vehicles, the level of congestion, driving patterns, the conditions of the vehicle, and the type of fuel available.



BOX 14: INSTRUMENTS AVAILABLE FOR GENERATING SUSTAINABLE MOBILITY

Planning Instruments

These include all the measures that are focused on the planning of urban growth and its infrastructure. The ordering of the activities that take place in a given territory plays a key role in reducing the kilometres travelled by car and achieving an integrated and sustainable transport system.

This requires a change in the pattern of development that influences a city's location, scale, density, design, and mixture of land uses.

Outstanding among planning instruments are the re-densification of city centers, mixed land use, planning oriented to transport, car-free planning, and intelligent urban development. They also include the provision of public and non-motorised transport, and public systems for bicycles and cars.

Regulatory Instruments

Known as instruments of command and control, these instruments are focused on reducing kilometres travelled by cars and are of two types, physical and legal.

Regulating space by means of physical instruments consists of constructing infrastructure that discourages car use and encourages the use of other modes of transport. Examples include the construction of traffic calming zones or the pedestrianisation of streets.

Regulatory instruments of the legal type are the laws, norms, and regulations that cars and their owners must comply with. Examples of these are low-emission zones, high-occupancy lanes, emission and circulation regulations, regulating minimum parking requirements for businesses and construction sites, and regulation of ownership.

Economic Instruments

These oblige the motorists to pay for the damages they inflict on society, encouraging less reliance on cars and thereby increasing social well-being. Among the different instruments are the fuel tax, the property tax, parking metres, and congestion charges.

Empowering these instruments requires incentives for less polluting car use, such as feebate schemes (discounts on the purchase of new and efficient cars and fees on inefficient ones - Medina *et al.*, 2011) and schemes for scrapping old vehicles.

Likewise, the necessary incentives can be generated for promoting public transport by means of subsidies or financing with public spending.

Information Instruments

Campaigns for awareness building, sensitisation, making information public, and policies on education: these "soft" instruments generate changes in behaviour and can be decisive for the success of other instruments implemented.

Technological Instruments

Their potential resides in increasing the benefits of other measures intended for reducing car use. For example, the dissemination of information by means of mobile phones on parking prices and availability of spaces contributes to reducing the distances travelled by motorists, empowering parking administration policies.

Source: ITDP, based on Dalkmann and Brannigan (2007).

It is important to point out that each of these instruments has a spectrum of how mandatory it is to implement, varying from voluntary to obligatory (*see Illustration 4*). The current magnitude of the problem—the accelerated growth of negative externalities from car use—makes full use of the spectrum of instruments, from the least to the most restrictive. The application of voluntary and less restrictive instruments, as well as the use of market-based economic instruments, no doubt contribute to reducing the problem. This is not to say that the regulatory instruments are to be neglected, especially the physical, which together with other measures allow for the effective reduction in indiscriminate car use.

ILLUSTRATION 3: STRATEGY APPROACHES

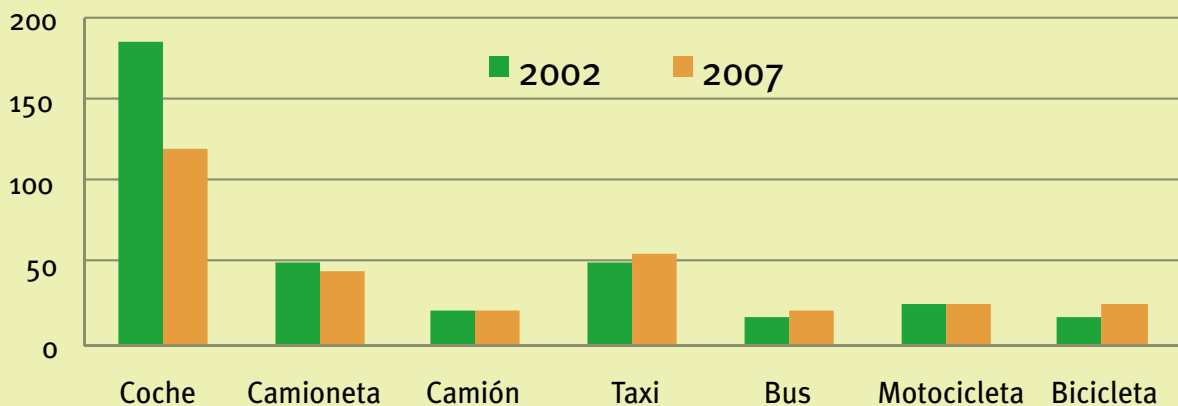


Source: Adapted from Dalkmann and Brannigan (2007)

BOX 15: CONGESTION CHARGE IN LONDON, ENGLAND

The City of London uses an economic instrument to reduce congestion problems and their social costs. A “congestion charging” scheme was implemented in 2003 (currently 9 to 12 pounds sterling a day, approximately 170 to 227 Pesos) for those driving in the city’s downtown between 7 a.m. and 6 p.m. The net income collected during the first three years was 189 million pounds (3.5 billion Pesos), which was used for financing public transport. The end result is that between 2003 and 2007 traffic was reduced by 30%.

Daily number of vehicles entering London’s congestion charging zone, 2002–2007 (thousands)



Source: With data from TfL (2008)

4. National Policy Recommendations

Given the gravity of the problems caused by car use and their implications for Mexico's future, the Institute for Transportation and Development Policy suggests the implementation of four types of policies:

- A) The creation of a federal institutional and financial platform that allows for implementing a long-term public policy for sustainable urban transport and lower car use.
- B) The implementation of fiscal policy that reduces the negative impact of car use and finances public and non-motorised transport, as well as demand management strategies such as parking meter systems.
- C) Auxiliary measures to be implemented in the medium term that allow for consolidating the previous policies.
- D) Strategies recommended for states and municipalities, all based on the strategies of **avoiding, shifting, and improving** urban travel.

4.1 Development of an Institutional Platform for Public Policy

Create a division at the federal level specialised in this topic, develop the legal and planning framework for support, generate financing for urban transport and mechanisms for its technical assessment, and create information systems on mobility in Mexican cities.

Strategy	Avoid	Responsible	Federal Executive branch, Congress
Instrument	Planning	Actors	Ministry of Social Development, Ministry of Communications and Transportation, Ministry of Finance and Public Credit, Congress of the Union
<p>1.1 Creation of division specialised in urban transport within the federal government. The federal government needs an area dedicated to public policy on urban transport, equipped with a large technical team and the capability to review and manage projects. Likewise, this area would collect data on urban transport at the national level for strategic decision-making purposes. It is strongly recommended that this area be led by the authority in charge of urban development planning. As a last resort it could be constituted as a decentralised organism; however, this would require several institutional reforms. Some of the area's responsibilities would be: support for handling and reviewing urban transport projects, relative to the Federal Programme in Support of Federal Transport, the National Infrastructure Fund, and others (i.e., Metropolitan Fund); support for coordinating the technical training programmes for subnational entities; maintaining an area of research on transport so as to compile, analyse, and make accessible national data on transport systems for strategic decision-making purposes.</p> <p>Regulatory Changes: In the first place the Organic Law of the Federal Public Administration would need to be modified, so as to grant the faculties for driving the urban transport policy to the corresponding authorities. Depending on which ministry this is, the following needs to be done: A) Modify the General Law on Human Settlements, and, within the first chapter, add a new objective that stipulates the establishment of an urban transport policy. Additionally, the respective faculty, as well as the inclusion of a new chapter in the Law that deals exclusively with urban transport, will have to be pointed out to each level of government. This option is the most recommended, given its ease of application and the importance of urban transport in city planning. B) Enact a General Transport Law that includes urban transport, establishing the coordination of various government bodies involved in transport, and assigning the ministry to which this specialised area would belong.</p>			
Financing	Requires a budget expansion for whatever ministry it is ascribed to.		

Strategy	Avoid	Responsible	Federal Executive branch, Congress of the Union
Instrument	Planning	Actors	Ministry of Social Development, Ministry of Communications and Transportation, Ministry of Finance and Public Credit, or the new specialised area
<p>1.2 Within the National Development Plan, stipulate the creation of integrated sustainable urban transport systems as a guiding principle of development, which includes the reduction of car use in Mexico, more public and non-motorised transport, and developments with greater densities and mixed land uses. This topic should be open to discussion and participation on the part of civil society, as is set up in the Planning Law.</p> <p>Regulatory Changes: Revision and adaptation of the National Development Plan to include new area of urban transport and participation of civil society, proposed to the Ministry of Finance and Public Credit.</p>			
Financing	Not required.		

Strategy	Avoid	Responsible	Federal Executive branch, Congress
Instrument	Planning	Actors	Ministry of Social Development, Ministry of Finance and Public Credit, and Congress
<p>1.3 Establish and publish a National Programme for Urban Development and Territorial Ordering (NPUDTO) that explicitly includes the management of urban mobility and the reduction of car use as two of its goals, as well as strengthen the urban planning mechanisms focused on mobility. Mexico needs an updated framework for the development of its cities in light of the severe mobility problems it faces. The implementation of policies for the creation, development, and upgrading of public transportation must be established as a national priority, along with: the creation of infrastructure for non-motorised transport, including public cycling systems; measures for managing car travel, such as carpooling and regulating parking away public roads; the use of planning, regulatory, economic, information, and technological instruments for reducing negative externalities from car use.</p> <p>Another option is the creation of a National Urban Transport Plan, which would be in accord with the National Programme for Urban Development and Territorial Ordering. This option is not the most recommended, as it could end up duplicating or contradicting the efforts of the latter.</p> <p>For the creation of either of these programmes, necessary mechanisms will have to be put in place for citizen participation, to ensure their inclusion in decision-making.</p> <p>Regulatory Changes: Publication and modification of NPUDTO. This is reinforced if the area specialised in urban transport is ascribed to the Ministry of Social Development with the necessary modifications to the General Law on Human Settlements. Likewise, the suggestion is to approve the proposed reforms to the General Law on Human Settlements, in articles 27 and 155, as this would provide the basics for the reuse of land in city centers and would allow for coordination between different levels of government in different metropolitan areas.</p> <p>If applicable, legislation of a new programme at the federal level. This could be derived from the General Law on Human Settlements, should it be created, or from the proposal for the General Urban and Suburban Transportation Law if approved.</p>			
Financing	The financing for the fulfilment of the objectives of the programme could come out of the existing federal funds applied to mobility: Fondo Metropolitano, Fondo de Pavimentación a Municipios (FOPAM); Programas y Fondos Regionales (ramo 23); Fondo de Aportaciones para el Fortalecimiento de las Entidades Federativas (FAFEF); Fondo de Aportaciones para el Fortalecimiento de los Municipios y de las Demarcaciones Territoriales del Distrito Federal (FORTAMUNDF); Fondo de Aportaciones para la Infraestructura Social (FAIS); HABITAT programmes; Recovery of Public Spaces, as well as the Reassignment and Decentralisation Agreements for states and municipalities.		

Strategy	Avoid	Responsible	Ministry of Social Development
Instrument	Planning Economical Regulatory	Actors	Ministry of Social Development, National Workers Housing Fund Institute, Federal Mortgage Society, National Housing Commission
<p>1.4 Establish a national policy on housing that provides no incentive for the expansion of cities or for reliance on car use. All urban development policies must have a policy on housing, governed by the National Programme for Urban Development and Territorial Ordering, and must have transportation as a guiding principle. To this end the role of the nation's financial policy for social housing must be revised, focusing on the development of housing in downtown neighborhoods instead of the periphery of cities. The policy must generate financial mechanisms to drive both urban recycling and rental housing within cities.</p> <p>Regulatory Changes: Change of criteria for granting mortgages and bridge credits in public housing organisms, as well as an active push for rental housing.</p>			
Financing	Has its own resources.		

Strategy	Avoid	Responsible	Federal Executive branch
Instrument	Planning	Actors	Ministries entrusted with each programme and national strategy
<p>1.5 Define specific goals for reduced car use, measures such as Vehicle-Kilometres Travelled, and for promoting public and non-motorised transport in the following national programmes: National Programme for Urban Development, National Housing Programme, National Infrastructure Programme, Sectorial Programme on Environment and Natural Resources, Special Programme on Climate Change, Public Health Programme and in the National Strategy on Energy. If necessary, we recommend creating and establishing a National Urban Transport Plan.</p> <p>Regulatory Changes: Modification of each national programme and strategy, as well as of corresponding laws, such as the General Law on Human Settlements, the Housing Law, or the General Law for Ecological Balance and Environmental Protection.</p>			
Financing	The financing pertinent to each party involved in the national programmes and strategies.		

Strategy	Shift	Responsible	Federal Executive branch
Instrument	Economical	Actors	Ministry of Finance and Public Credit, National Bank of Public Works, Congress
<p>1.6 Fortify federal financing for urban mobility by establishing specific funds, aligned with the National Development Plan, the National Programme for Urban Development, and Territorial Ordering; establish basic requirements for access to such funds, such as having an Integrated Sustainable Urban Mobility Plan. To this end, the existing funds can be modified or, if pertinent, specific funds can be created. The federal funds that require modifications to their criteria, guidelines, or operating rules should be identified so that projects can be financed, such that the investment in public and non-motorised transport is made a priority over the construction of more road infrastructure for cars (i.e., rapid transit roads, overheads or urban motorways). The Federal Programme in Support of Mass Transit of the National Infrastructure Fund and in the case of the Metropolitan Fund must especially modify their existing criteria. In like manner, when so required, the necessary funds must be created for the financing of specific measures, such as non-motorised transport or mobility management measures.</p> <p>It is strongly suggested that, in order to access these funds, there be an express obligation to present Integrated Plans for Sustainable Urban Mobility (IPSUM) updated and in coordination with the National Development Plan, National Programme for Urban Development and Territorial Ordering, and the local Metropolitan or Urban Development Plan. In the case of the metropolitan areas, they should present an IPSUM that includes the planning of total mobility in said area.</p> <p>Regulatory Changes: Modification of the Fiscal Coordination Law, creation of new funds, or modification of criteria and guidelines for operation of already existing ones. These should be in line with the aforementioned recommendations on planning.</p>			
Financing	The financing can come from the existing federal funds applied to mobility: Fondo Metropolitano, Fondo de Pavimentación a Municipios (FOPAM); Programas y Fondos Regionales (ramo 23); Fondo de Aportaciones para el Fortalecimiento de las Entidades Federativas (FAFEF); Fondo de Aportaciones para el Fortalecimiento de los Municipios y de las Demarcaciones Territoriales del Distrito Federal (FORTAMUNDF); Fondo de Aportaciones para la Infraestructura Social (FAIS); HABITAT programmes; Recovery of Public Spaces, as well as the Reassignment and Decentralisation Agreements.		

Strategy	Shift	Responsible	Ministry of Social Development, Ministry of Communications and Transportation, Ministry of Finance and Public Credit
Instrument	Regulation	Actors	Ministry of Social Development, Ministry of Communications and Transportation, Ministry of Finance and Public Credit
<p>1.7 Establish mechanisms for the evaluation, review, and approval of financing mobility projects using federal funds. In order for federal funds to be used it is required that they be reviewed by the specialised technical area created for urban mobility. This area will be in charge of ensuring they comply with sustainability criteria and car use established within the national planning systems. The evaluation criteria should include a cost-benefit assessment, which will incorporate a full appraisal of negative externalities imposed on society by a project (i.e., emissions, noise, congestion, health, accidents, water), as well as a comparison of the project with other types of solutions on mobility (different options of public transport and non-motorised transport, among others).</p> <p>Similarly, a specific area needs to be created within the Investment Unit of the Ministry of Finance and Public Credit (for example, an Assistant General Director's Office covering 2 areas: public transport and non-motorised mobility) that will be charged with reviewing and approving the viability of the projects with a focus on accessibility.</p> <p>Finally, the Law for Public Private Associations must be modified so that all mobility-related efforts include a full appraisal of cost-benefit and a comparison with different solutions on mobility (different options for public transportation and non-motorised transport, among others).</p> <p>Regulatory Changes: Organization of the specialised technical area (SEDESOL, SCT or decentralised organ) charged with reviewing or approving projects. Modification of the organic structure of the SHCP.</p>			
Financing	Expand the budget of the ministries in question.		

Strategy	Avoid Shift Improve	Responsible	Ministry of Finance and Public Credit
Instrument	Planning Information Technological	Actors	National Institute of Statistics, Geography and Informatics; National Institute of Ecology, Mexican Institute of Transportation
<p>1.8 Establish a system for gathering and generating data on urban mobility and car use, and for dissemination to the public. In order to broach the urban mobility issue, the necessary data must be generated to diagnose problems and solutions, and monitor the evolution of implemented public policies. To this end the following needs to be done: A) Set up a national survey on urban mobility that captures data on the use of different transport modes in Mexico. B) Establish a system for gathering data on car use. We recommend collecting the data of vehicle-kilometres travelled contained in Mexico's current emission controls programmes. This information must bring together other data related to car use, such as maintenance costs, average occupancy, average speed, travel mode share, among others. C) Establish the obligation of local governments in metropolitan areas to conduct origin-destination surveys every five years as a prerequisite for federal funds dedicated to transport. D) Grant the responsibility for centralising and disseminating data to the National Institute of Statistics, Geography and Informatics, with support from the Mexican Institute of Transportation and the National Institute of Ecology.</p> <p>Regulatory Changes: Addition of objectives and goals within the National Institute of Statistics, Geography and Informatics, the National Institute of Ecology and the Mexican Institute of Transportation. Modification of guidelines and rules of operation for federal funds and addition of objectives for air quality monitoring programmes.</p>			
Financing	Grant a budget from the federation to each institute.		

4.2 Actions for Immediate Implementation

The harmful effects of excessive car use on society are serious, and, as car use continues to rise, they reduce the long-term environmental health and stability of Mexican cities. It is necessary to implement immediate public policies that encourage or provide incentive for the reduction of car use, while at the same time generating resources for the construction of infrastructure for public and non-motorised transport.

Strategy	Avoid	Responsible	Ministry of Finance and Public Credit
Instrument	Economical	Actors	Ministry of Finance and Public Credit, Congress
<p>2.1 Gradual elimination of the gasoline subsidy and channelling of funds previously used to that end for public and non-motorised transport, as well as to public space; or channelled to the funds mentioned in point 1.6.</p> <p>Regulatory Changes: Modification of the Special Tax on Production and Services.</p>			
Financing	Generates resources		

Strategy	Avoid	Responsible	Ministry of Finance and Public Credit
Instrument	Economical	Actors	Ministry of Finance and Public Credit, Ministry of Environment and Natural Resources, Congress
<p>2.2 Establish an annual tax per automobile in circulation as a function of its negative externalities or of some environmental parameter such as yield by kilometre travelled. What is collected should be redirected to measures that benefit the population directly, such as public and non-motorised transport or public space, for example.</p> <p>Regulatory Changes: Modification of the Special Tax on Production and Services and of the Income Law.</p>			
Financing	Generates resources		

Strategy	Avoid	Responsible	Ministry of Finance and Public Credit
Instrument	Economical	Actors	Ministry of Finance and Public Credit, Ministry of Environment and Natural Resources, Ministry of Communications and Transportation, Congress
<p>2.3 Creation of a national programme on <i>feebates</i> that charges a fee on the purchase of new vehicles considered inefficient and polluting, which will finance discounts for the acquisition of new efficient and non-polluting cars (Medina <i>et al.</i>, 2011). Should there be any type of surplus from these fees, it could be redirected to finance programmes for scrapping old cars.</p> <p>Regulatory Changes: New legislation in tax matters.</p>			
Financing	Generates resources		

Strategy	Avoid Shift	Responsible	Ministry of Finance and Public Credit
Instrument	Economical	Actors	Ministry of Finance and Public Credit and Congress
<p>2.4 Boost the financial autonomy of the states through mobility management strategies such as congestion charges and the regulation of parking on public roads by parking metres. This reduces externalities from unrestrained use of automobiles, while at the same time generates resources locally that are reinvested in public, non-motorised transport and public space.</p> <p>Regulatory Changes: Modification of local legislation</p>			
Financing	Generates resources		

Strategy	Avoid Improve	Responsible	Ministry of Communications and Transportation
Instrument	Regulatory	Actors	Ministry of Communications and Transportation, Ministry of Public Security
<p>2.5 Establish at the national level a mandatory driving test for obtaining a driver's license, a national census on licenses, and a point-based system for licenses for driving infractions. The latter is for the purpose of reducing the incidence of road accidents and fostering safer driving practices.</p> <p>Regulatory Changes: Requires its own by-laws or a national census.</p>			
Financing	They have resources		

Strategy	Improve	Responsible	Ministry of Environment, Natural Resources & Fisheries
Instrument	Regulatory Technological	Actors	Ministry of Environment, Natural Resources & Fisheries, Ministry of the Economy, Ministry of Finance and Public Credit and Ministry of Energy
<p>2.6 Publish and apply the energy-efficiency norm for new vehicles. At present the federal government is working on a norm for efficiency of new light-duty vehicles, which has not yet been published. This ruling must not allow for separate, relative standards for automobiles, trucks, and SUVs, (as is the case in the U.S. under new Corporate Average Fuel Economy regulations), because this provides an incentive for the manufacture and sale of less efficient trucks and SUVs.</p> <p>Regulatory Changes: Requires the issuance of a respective Official Mexican Norm.</p>			
Financing	Grant the Ministry of Environment, Natural Resources & Fisheries a larger budget		

Strategy	Improve	Responsible	Ministry of the Economy, Ministry of Environment, Natural Resources & Fisheries
Instrument	Regulatory	Actors	Ministry of the Economy, Ministry of Environment, Natural Resources & Fisheries
<p>2.7 Update vehicle inspection standards in the existing local programmes and on the border. Current vehicle inspection standards must be at the highest level in the world, such that they impede the circulation of highly polluting vehicles in Mexico. Likewise, vehicle inspection programmes must be in compliance with national standards.</p> <p>Regulatory Changes: Requires modification of NOM-041-SEMARNAT-2006</p>			
Financing	Self-financing capability		

Strategy	Improve	Responsible	Ministry of the Economy, Ministry of Environment, Natural Resources & Fisheries, Ministry of Finance and Public Credit
Instrument	Regulatory	Actors	Ministry of the Economy, Ministry of Environment, Natural Resources & Fisheries, Ministry of Finance and Public Credit
<p>2.8 Establish a national programme for scrapping obsolete private cars and public transportation units.</p> <p>Regulatory Changes: Requires the creation of specific guidelines for said programme.</p>			
Financing	Financing through <i>feebates</i> or taxes on carbon, VKT or other externalities.		

BOX 16: PROPOSAL FOR GENERAL LAW FOR URBAN AND SUBURBAN TRANSPORT IN MEXICO

A General Urban and Suburban Transport Law would help create a National Commission for Urban and Suburban Transport as a coordinating entity for mass transport, and create a National Fund to drive the development of mass transport in the country.

The principal characteristics of this law have to do with the integration of the commission and with the workings of the fund. The commission would be made up of eleven regional delegates chosen by the states, who would decide on the financing programme and the amounts for mass transport projects.

On the other hand, the proposal is that this be a trust fund administered by the Banco Nacional de Obras and Servicios Públicos (National Bank for Public Works and Services) with a double financing mechanism: a fixed component (general destination) linked to the yield from the fuel tax, (similar to the way the federal participations work), and a variable component (specific destination) that functions as a distribution mechanism for individual investment projects (as is the case of Item 23 of the Federal Expenditure Budget).

The fund could contribute up to 80% of the total cost of mass transport projects and up to 75% for cycling infrastructure projects. The promoters of the projects must adhere to a series of regulations approved by the commission (regulations for adherence), in order to have access to the fund.

4.3. Auxiliary Measures

For the purpose of reinforcing the above-mentioned policies, auxiliary policies need to be implemented such as the creation of human capital, research and development in urban transport, and incentives for reducing car use.

Strategy	Avoid Shift Improve	Responsible	National Council of Science and Technology
Instrument	Information	Actors	National Council of Science and Technology, Ministry of Public Education
<p>3.1 Create a National Council of Science and Technology fund for research on mobility management in urban areas.</p> <p>Regulatory Changes: Not applicable.</p>			
Financing	Resources of the National Council of Science and Technology		

Strategy	Avoid Shift Improve	Responsible	Public universities
Instrument	Information	Actors	Public universities, Ministry of Public Education, National Council of Science and Technology
<p>3.2 Establish master and doctorate programmes in public universities focused on urban mobility management. These would generate research, knowledge, and the necessary capabilities for effectively dealing with urban mobility.</p> <p>Regulatory Changes: Requires modification of the internal legislation at public universities.</p>			
Financing	Resources of the National Council of Science and Technology		

Strategy	Avoid Shift Improve	Responsible	National Institute of Ecology, Mexican Institute of Transportation, National Commission for the Efficient Use of Energy, National Public Health Institute
Instrument	Information	Actors	National Institute of Ecology, Mexican Institute of Transportation, National Commission for the Efficient Use of Energy, National Public Health Institute
<p>3.3 Align and encourage the work of governmental research institutes on the subject of car use reduction and the growth of public and non-motorised transport. The institutes charged with that task must be the National Institute of Ecology, Mexican Institute of Transportation, National Commission for the Efficient Use of Energy, and National Public Health Institute.</p> <p>Regulatory Changes: Modification of the institutes' working programmes</p>			
Financing	They have resources		

Strategy	Avoid	Responsible	National Insurance and Surety Commission
Instrument	Regulatory	Actors	National Insurance and Surety Commission, Ministry of Finance and Public Credit, Ministry of Health, Ministry of the Economy
<p>3.4 Promote the purchase of car insurance based on kilometres travelled. This strategy reveals to motorists the real costs of driving, and in so doing, allows them to save money by purchasing more efficient vehicles. The measure would benefit low-income motorists who drive less often, by making automobile insurance more accessible. The implementation of the Safe Kilometre Insurance Strategy is primarily in the hands of the insurance companies. Nevertheless, local, state, and federal governments, through their transport ministries, could convert this type of vehicle insurance into a requirement or create measures for providing incentives for it.</p> <p>Regulatory Changes: Requires its own by-laws or a national census.</p>			
Financing	Self-financing capability		

Strategy	Reduce	Responsible	Ministry of the Economy, Ministry of Finance and Public Credit, Congress
Instrument	Regulatory	Actors	Ministry of the Economy, Ministry of Finance and Public Credit, Congress
<p>3.5 Modify foreign trade policy. In light of the imminent mass entry of used cars from the United States, and its subsequent impact on the environment, negotiations with the U.S. and Canadian governments will have to be set up.</p> <p>Regulatory Changes: Requires a renegotiation of NAFTA (North American Free Trade Agreement).</p>			
Financing	Not required.		



4.4 Strategies at the State and Local Level

The responsibility for implementing car-reduction policies at the urban level is held primarily by state governments, but also municipalities. Mobility strategies at these two different levels of government can be quite divergent but it is important for them to be aligned with the same objective. For instance, the road offering for public transport may be increased while at the same time demand for cars increases or road infrastructure is expanded, which is counterproductive. The following proposed strategies will generate a strong reduction in car use and its externalities, thereby promoting social equity and more efficient public spending.

Strategy	Shift Improve	Responsible	Those responsible for management of public transport in Federal and Municipal Governments
Instrument	Economical Planning	Actors	Organisms related to transportation, Metropolitan Development Councils, Ministry of Finance and Public Credit
<p>4.1 Physical, financial, and operational integration of urban public transport as the most efficient mechanism for guaranteeing adequate levels of performance and service; the creation of a central public organism (even metropolitan) that will allow for institutional and operational coordination of the system, and will direct the planning of investment and growth of the network. The overall objective is to create more efficient, quick, and comfortable journeys, and improve the connections among origin, stations, public transport, and destination. The promotion of pedestrian and cycling mobility is an ideal way to promote a change in transport mode. What needs to be addressed: restructure routes on public transport systems; reduce the surplus offering; improve road infrastructure; better dissemination of information to the public.</p> <p>Regulatory Changes: Modification of the organic laws that govern the public transport organisms and the state transport laws.</p>			
Financing	Own resources and those of existing federal funds applied to mobility, such as the Metropolitan Fund and the National Infrastructure Fund.		

Strategy	Shift Improve	Responsible	Governors and municipal presidents
Instrument	Economical Planning	Actors	Entities and organisms in charge of the granting of transport-related concessions (these may be state or municipal)
<p>4.2 Transform the present operational scheme of public transport concessions, promoting the creation of organised businesses and modifying the concession figure towards models of contract for services. This must include the creation of controlling public organisms that administers fees collected separately, in exchange for compliance with adequate levels of operation and performance on the part of the operators.</p> <p>Regulatory Changes: Modification of the state regulation that governs transport-related concessions and creation of a public controlling organism.</p>			
Financing	Own resources and those of existing federal funds applied to mobility, such as the Metropolitan Fund and the National Infrastructure Fund.		

Strategy	Shift	Responsible	Public Works areas of the states and municipalities
Instrument	Regulatory Planning	Actors	Ministry of Social Development, Ministry of Communications and Transportation
<p>4.3 Efficiently administer, manage, and maintain current infrastructure without necessarily expanding the road offering. The mobility management criterion gives priority to the use of roads for public transportation, pedestrians, and cyclists. Direct the investment in roads to improve current infrastructure and not to expand road capacity.</p> <p>It should be emphasised that primary streets should guarantee the optimum level of service for all transport modes: pedestrians, cyclists, public transport, and vehicles. The implementation of confined lanes along stretches of heavy traffic encourages use of pedestrian pathways and attracts public transport users. “Calm traffic areas” on secondary and local streets for vehicles driving at low speeds and low flows promote the use of public space and the safety of pedestrians and cyclists. Guaranteeing that these streets will not be used for short cuts is pivotal to reducing car use on short trips and to making use of non-motorised modes of transport, and consequently those of public transport, more attractive.</p> <p>Regulatory Changes: Establish state regulations that govern the design of roads depending on their function. Design national manuals for the purpose of drawing up state norms.</p>			
Financing	Own resources and those of existing federal funds applied to mobility, such as the Metropolitan Fund and the National Infrastructure Fund.		

Strategy	Avoid Shift	Responsible	Areas of urban development and public space of the states and municipalities
Instrument	Information	Actors	Areas of transit and roads, of control of business establishments and construction sites
<p>4.4 Managing parking is one of the most important mechanisms for reducing car use. Progressive policies centre on assigning a specific fee for parking, determined by area, generating incentives for avoiding car travel and shifting to other modes or carpooling. Parking metres are usually the most popular way governments charge for parking on public roads, given that the initial investment is usually private and generates an income. According to general criteria, the equilibrium fee would be such that it allows for 15% of spaces to be available at any given time. The ideal mechanism, therefore, is that of a variable fee as a function of demand, that is to say, as a function of the area and of the time of day. The key to this management model is that it works not on the basis of the operating cost or of a specific goal in terms of revenue, but with a clear goal of reducing car use.</p> <p>A second action is a policy on intelligent parking for new developments. In many of Mexico’s cities there are policies that oblige developers to offer a certain number of parking spots. What happens with this regulation is that the offering is artificially inflated under the erroneous (and obsolete) criterion that it results in a better quality of life for the inhabitants. Not only do these minimum norms need to be eliminated, but reversed to set maximum limits in certain areas of the city.</p> <p>Finally, the construction of park-and-rides near transport stations is also a strategy that should be taken into account. Rather than reducing car use directly, this in reality is an incentive for the use of public transport, providing access to the system for certain users who are not very willing to use the feeding and auxiliary routes.</p> <p>Regulatory Changes: Norms on minimum parking spots required on new sites and business establishments.</p>			
Financing	Own resources and those of existing federal funds applied to mobility, such as the Metropolitan Fund and the National Infrastructure Fund. Required for the studies, or if pertinent, the initial investment.		

Strategy	Avoid Shift Improve	Responsible	Variable
Instrument	Information	Actors	Areas of transit and roads, areas of public works, and urban services
<p>4.5 Charging a fee for the use of the road infrastructure. The payment may be per kilometre in the case of pedestrian paths, or there may also be a congestion charge in some areas of the city. The former is an option used under a concession scheme for the construction, operation, and maintenance of inter-urban motorways. Applying this model on existing roads is an option for both reducing demand and for generating income for its maintenance.</p> <p>Regulatory Changes: Not required</p>			
Financing	Own resources and those of existing federal funds applied to mobility, such as the Metropolitan Fund and the National Infrastructure Fund. Required for the studies, or if pertinent, the initial investment.		

Strategy	Avoid Shift	Responsible	Areas of transit of the states and municipalities
Instrument	Economical Information Technology	Actors	
<p>4.6 Incentives for car sharing. Car sharing, or private clubs for the rental of shared vehicles, is a sufficiently flexible system to be adapted to the needs of the user. The most important effect of this system is the direct impact on the reduction of vehicles, and consequently, indirectly on the VKT. The implementation of preferential rates or parking permits for this type of vehicle, as well as support with financing, could be two public strategies for promoting it. Aside from car-sharing programmes, high-occupancy lanes—exclusively for the use of vehicles carrying at least two or three persons—can be implemented. This is a complementary measure to carpools, free programmes for sharing private cars on journeys with a similar origin and destination. The general idea is to discourage trips in private cars with a single passenger, which is the most costly and inefficient transport mode. The high occupancy lanes in principle must be implemented relatively simply on controlled access roads.</p> <p>Regulatory Changes: Reforms to the transport law so as to include figures and rules.</p>			
Financing	Own resources, federal funds or private financing.		



5. Final Remarks

It is estimated that in 2050 Mexico could be among the largest economies in the world (Goldstone, 2011 and Hawksworth & Gordon, 2008). For that to occur, improving mobility in cities is a must, critical for the economic activities and quality of life of millions of people. Privileging the private car as the centre of urban mobility is generating high social, economic, and environmental costs that could prevent Mexico from becoming a competitive player in the world economy.

Mexico can still reverse poor planning and policies and avoid mistakes that other nations have made, putting their environmental sustainability at risk. If we implement adequate measures, including a reduction in car use and increase in public and non-motorised transport, it is possible to guarantee sustainable mobility in cities and in the country as a whole. This would ultimately improve the quality of life of Mexicans and reduce inequality in the country.

Finally, it is important to emphasise that this is a challenge of great national importance, requiring the action of both the federal government, as well as the participation of local governments.



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