Vehicles looking for a parking space represent a basic component of urban traffic congestion. This component cannot be eluded in a context where a lot of efforts are done to reduce traffic nuisance and gas emissions. Few studies have been led in France to quantify the stakes related to this phenomenon.

SARECO has led a research study for the PREDIT (French research program) and the ADEME (Agency for environment and supervision of energy) in order to evaluate the stakes linked to the time lost by car users while looking for a parking space in France.

**THE METHODOLOGY**

The research was conducted in 4 steps:
- Evaluating as precisely as possible the accumulated time spent by car drivers looking for a parking space in four French urban areas: Grenoble (Vaucanson district), Lyon (Presqu’île district), Paris (Commerce district and Saint-Germain district). A methodology has been developed grouping field-studies and interviews carried out in order to precisely evaluate the aggregate amount of time lost in searching for a parking space.
- Extrapolation of these investigations to France as a whole, in order to have a rough estimate of the time spared by French drivers looking for a parking space.
- Quantitative and monetary evaluation of the extent of the nuisances linked to the search-traffic.
- Investigation on the ways of reducing time spent looking for a parking space and their consequences on the cities.

**IDENTIFICATION OF CAR DRIVERS’ BEHAVIORS**

When a car driver looks for a parking space, he creates a certain relation with the space in which he moves. The strategy he will carry out depends not only on the urban context but also on his individual characteristics: motivation of the trip or other more personnel factors such as the subjective perception of
different parking types: car park or on-street parking, permitted or forbidden parking, free parking or pay parking, etc…

The parking spiral and the “switches”

while searching for a parking space, the car driver progressively enlarges the circle of his search. Under 15 minutes, the average distance to the destination is less than 200 m. When the search time exceeds 15 minutes, the distance becomes more and more important and can extend up to 500 m (550 m in average in Lyon for a searching time of 45 min).

Therefore, the methodology of the CERTU’s « Time needed to find a parking space » that limits the search-zone in a 250 m circle seems to be a limited modelisation of the time spent in searching.

The Switches

In the process of looking for a parking space, the car driver takes different decisions representing his search strategy. These decisions are referred to as switches. After having searched in vain for an authorized space (this period can be zero if the car driver knows in advance that this search is in vain or if he is sensitive to a long searching time) the car driver can “switch” and change his scope towards:

- **Searching for a pay parking space** if the initial search was for a free parking.

- **Searching for an unauthorized space**: the switch towards this new scope is usually immediate. Car drivers are either directly parking in an unauthorized space or will never park in an unauthorized space. In Paris, this decision is much more frequent than in any other studied city because car drivers are well aware of the extremely low probability of finding an authorized space.

![Figure 1: The parking spiral](image)

![Figure 2: Unauthorized parking in the 4 studied districts](image)
• **Searching for an off-street parking:** A majority of the car park users (more than 3 quarters of them) choose not to look for an on-street space and to drive directly to a car park. ¼ search first on-street. Their time spent in searching is similar to the average of searching time within the studied zone.

• In extreme cases, if in spite of the “switches”, the driver does not succeed in parking his car, he can **abandon his trip.** 64% of the interviewed residential car owners in the 4 districts declare that they have abandoned their trip at least once after having searched for a space without being able to find one. The disparities between the different zones are important. The percentage of car owners that abandoned their trip at least once reaches 48% in Grenoble, 67% in Lyon and 100% in both of the Parisian districts!! This phenomenon can have important consequences for the dynamism of a district and its business, especially if an adequate public transport supply is missing.

**THE NEGATIVE COLLATERAL EFFECTS OF SEARCHING TIME**

A direct negative effect is of course the time spent by the motorist in his car, as this activity is obviously unproductive. For each of the studied districts the lost time per day is about a hundred hours. The average searching time is 3,3 minutes in Grenoble, 11,8 minutes in Lyon, and in Paris, 10 minutes in the Commerce district and 7,7 minutes in the Saint-Germain district. Most of the cars in a city-centre are visitors’ cars. Most of the time lost by searching for a parking space is therefore due to visitors. However, the residents are those losing individually most of the time (each searching process is longer).
The extrapolation France as a whole (also taking into account enquiries made by SARECO in smaller towns) has led us to an estimation of **70 million hours spent each year in France looking for parking spaces**, which represents about a 700 million € lost each year.

Besides, the search for a parking space causes the same negative effects as motorised traffic: noise, insecurity, air pollution, greenhouse effect, congestion. Not taking into account the subsequent congestion and the greenhouse effect, the negative effects caused by searching time costs France at least 70 million € per annum. Concerning the congestion, the part of the urban traffic caused by vehicles searching for a parking space is situated between 5 and 10 % in cities and can reach 60% in small streets.

**THE STAKES OF AN ELIMINATION OF SEARCHING TIME : REACHING THE OBJECTIVES OF THE PDU (PLAN DE DÉPLACEMENTS URBAINS)**

The urban traffic plan is an urban planning document for a 10 year period imposed on French cities with more than 100 000 inhabitants. Its objectives are to reduce motorised traffic and to develop alternatives ways of transport (public transports, biking, walking …)

- In Grenoble, the elimination of searching time would lead to half of the traffic reduction stipulated in the PDU for the inner city (transfer from cars to public transports or alternative ways).

- In Lyon, the elimination of searching time would reduce traffic volume in the city to the extent preconised by modal transfer in the Grand Lyon PDU.

- In Paris, the objective of the PDU Ile-de-France to reduce the traffic in Paris by 5% would be reached, and even surpassed, by the elimination of searching time.
The suppression of searching time: a realistic goal with a simple concept

One of the ways to reduce searching time is well-known: the implementation of an efficiently enforced toll.

- Implementing a toll means enforcement to limit uncivil behaviour.
- Then, street parking fares have to be increase until they create a local balance between supply and demand so that the occupation rate reaches around 85%, which guarantee on a short searching time. Besides, it is not always necessary to increase fares: sometimes controlling especially long-term users like commuters can reduce the occupation rate in a significant way.

Some examples of efficient tolls in france and in foreign countries

Three interesting cases have been identified during the research study:

- In Dijon, the sectors where on-street parking is managed by city employees, searching time has been drastically reduced.

- In London, in the district of Westminster, searching time has been totally eliminated thanks to an efficient control assisted by a high enforcement (a fine costs between 80 and 100 £ which means (about 130 €), meanwhile a fine costs only 11 Euros in Paris!). At the same time, fares have been increased until the occupation rate drops to 85%. At present, on-street parking fares are about 4 £ (about 6 €) per hour for visitors.

- In Rio on Janeiro, the informal toll system based on parking attendants succeeds in achieving very good results. Private people can exploit a section of a street by paying the city a licence fee. They fix fares for the on-street parking in their sector and adjusts their price to reach market set equilibrium.

However, the toll implementation leads to a mobility-segregation and can have undesirable long-term effects, especially if, subsequently, no alternative means of transportation are developed. The inner city could then become a rich « ghetto ».
Undesirable long-term effects?

The elitist characteristic of a toll creates a system based on mobility-segregation and can cause undesirable long-term effects. With increasing real estate prices in city-centres, low-income households have to leave the centre for the suburbs. At the same time, the application of a toll in the city-centre limits the accessibility of the city for lower income households of the suburbs especially if the far-off suburbs are not accessible by public transport. People then have no other possibilities to reach the centre than using their private cars. The toll could then lead the city centre to become only accessible and inhabited by rich people.

The collateral effect of parking shortage: a bigger stake

The compression of searching time can also have very important collateral positive effects, especially of a financial nature, namely:

- A reduction of peak traffic: the part of city traffic generated by the vehicles looking for a space could represent from 5 to 10% of global traffic. The suppression of searching time represents therefore a heavy stake.

- An efficient enforcement can also reduce the traffic at the rush hour by modal transfert of the working people and the number of long-term parked vehicles.

- If the rules were abided by, the management of pay parking would be largely profitable which is not often the case in France,

- If we take into account that to deal with on-street parking spaces wasted by users which do not respect the rules, many cities have built off-street parking spaces, the impact of the dysfunctional on-street parking enforcement can be estimated to an unproductive immobilisation of assets valued at around 8 billion Euros.

CONCLUSION

The research study presented in this article allowed us in the first place to develop a performing methodology to estimate the time lost in a limited sector searching for a parking space. The essential stake of the elimination of this searching time, besides the financial gain, is the reduction of motorised traffic.
This stake has far more consequences for France since around a quarter of the emissions of greenhouse gases can be associated with car use.

The stake of searching time reduction exceeds 1 billion euros each year, the subject should be studied thoroughly. France, with an average rate of respect for pay parking that is less than 30%, can certainly drastically reduce the amount of time wasted in searching for a parking space.

To refine the stakes of searching time and to adapt parking politics by trying to reduce this idle and lost time, a certain number of themes, still not well identified and defined, are worth being studied, as for example the phenomenon of renouncing to a trip or the undesirable long-term effects of pay parking on people’s mobility.