AutoCom, Quebec City and CommunAuto, Montreal

These two organisations are affiliated, the first to be created being AutoCom, the oldest car sharing organisation in Canada. It is one of those organisations which began as a non-profit collective, but has converted to an incorporated business.

Founded in 1994 and 1996, they have grown to 1000 members sharing 66 cars in Quebec and Montreal, which makes it the biggest organisation in North America (other car sharing services have started in Vancouver, Victoria and Toronto).

The charter and rules are similar to those of the other StattAuto type organisations. The organisation also has a similar membership profile. The car to person ratio is one for 15 users. The company growth rate is +50% per year. A survey estimates that, without CommunAuto, 500 additional cars would be circulating in Montreal and Quebec.

One difference with European systems might be found in the tariff system which is based on annual fees and integrates directly preferable tariffs for long distances, called Inter-réseau tariffs (through car rental companies).

In addition to the admittance fee (reimbursable when leaving the service) there are three types of annual fees: the more expensive the annual fee, the less expensive the km tariff:

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Fee</td>
<td>350 $ / 245 €</td>
<td>140 $ / 98 €</td>
<td>35 $ / 24,5 €</td>
</tr>
<tr>
<td>km fee</td>
<td>15 c / 0.10 €</td>
<td>22 c (15 c)*</td>
<td>22 c (18c)*</td>
</tr>
<tr>
<td></td>
<td>0.15 (0.10)* €</td>
<td>0.15 (0.13)* €</td>
<td></td>
</tr>
<tr>
<td>Tuesday to Thursday</td>
<td>1,50 € / 1,05 € per hour or 15 $ / 10.5 € per day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friday to Monday (peak)</td>
<td>2 $ / 1.4 € per hour or 20 $ / 14 € per day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inter réseau, week days</td>
<td>32,50 $ / 22,7 € per day</td>
<td>(300 km, 6 c / 0.4 € per km, 12 c / 0.8 € per additional km)</td>
<td></td>
</tr>
<tr>
<td>Inter réseau week end</td>
<td>32,50 $ / 22,7 € per day</td>
<td>(367 km, gasoline, 11 c / 0.7 € per additional km)</td>
<td></td>
</tr>
<tr>
<td>Inter réseau week</td>
<td>189 $ / € per week</td>
<td>(2100 km, 6 c / 0.4 € per km, 12 c / 0.8 € per additional km)</td>
<td></td>
</tr>
<tr>
<td>Inter réseau no km limit (5 days max)</td>
<td>38 $ / 26.6 € per day (6 c / 0.4 € per km)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* after 100 km

The service is said to be profitable under 12 000 km/year for formulae B and C and 16 000 km/year for formulae A.

AutoCom and CommunAuto have been trying to interest government and cities in supporting car sharing, and are making an effort to negotiate a partnership with the public transportation authorities (based on the results from European experience). In 1998, the organisation received the "Environment" award from the Quebec Transportation and Road Association. The organisation also received the moral backing and financial support of the Transportation Minister of Quebec.
CAN, Vancouver, Canada

The Vancouver organisation was established in 1997. As of 1998, CAN had 250 members and 18 vehicles. The entry and registration fee is $ 500 (350 €).

The Vancouver organisation shares many characteristics with StattAuto, in terms of reservations systems, placement of cars and other aspects. A difference is a more aggressive approach to capturing a broader band of market segments. As a result, a multiple tariff plan has been set up, shown in the table below. The name of each of the plans indicates the type of member/user the organisation has targeted.

<table>
<thead>
<tr>
<th>The Vancouver Multiple-user plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. <strong>The Weekenders:</strong></td>
</tr>
<tr>
<td>• $35 (24,5 €) monthly</td>
</tr>
<tr>
<td>• $15 (10,5 €) per day or $1.50 (1 €) per hour</td>
</tr>
<tr>
<td>• $0.15 (0,1 €) for every km</td>
</tr>
<tr>
<td>2. <strong>The Regulars:</strong></td>
</tr>
<tr>
<td>• $10 monthly (7 €)</td>
</tr>
<tr>
<td>• $15 (10,5 €) per day or $1.50 (1 €) per hour</td>
</tr>
<tr>
<td>• $0.25 (0,17 €) for every km</td>
</tr>
<tr>
<td>3. <strong>The Car-free:</strong></td>
</tr>
<tr>
<td>• $50 (35 €) yearly</td>
</tr>
<tr>
<td>• $15 (10,5 €) per day or $1.50 (1 €) per hour</td>
</tr>
<tr>
<td>• $0.30 (0,2 €) for every km</td>
</tr>
</tbody>
</table>

Vancouver carefully spells out charges for various types of delinquencies on the part of members. These are more explicit and detailed than the typical European organisation and are reproduced here as an example.
Miscellaneous Charges, CAN, Vancouver

Lost Key Replacement Charge $25 (17.5 €)

Late Return
(With possible extension) Regular rates
(Extension not possible) $10.00 (7 €) + comp. for disrupted member

Cancellation
> 24 hours n/c
> 12 hours 50% of hourly
< 6 hours 75% of hourly

NO SHOW 100% of hourly

Investigation of parking or photo radar speeding tickets - $10.00 (7 €)

Cleaning of car left unclean - $10.00 (7 €) + costs

Fee to restore/return of impounded or towed vehicle – Any accumulated charges

Autoshare Toronto

Autoshare Toronto was established in 1998 with 60 members and 5 cars. Its rules and routines closely reflect those of StattAuto.

The organisation has no explicit goal, but in the description of the organisation for potential members, these benefits are stated: for the member, low cost access to a car; for the environment, improve air quality, reduce noise, reduce congestion and reduce stress on green spaces; for the community, cars will take up less space on the streets and provide access to cars for people who were previously denied access.

There is a multiple membership rate plan, similar to that of Vancouver, but based on a specific estimated kilometre usage rather than on a type of user (weekend, regular, car free). Members choose the plan based on how much they think they will use the car. High users (A) pay a higher monthly cost but a lower kilometre cost. Low users (C) pay a much lower monthly cost, but pay double the kilometre cost.

<table>
<thead>
<tr>
<th>Autoshare Toronto User Plan</th>
<th>Monthly travel</th>
<th>Monthly cost</th>
<th>Cost Per Km</th>
<th>Cost per Hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>over 400 km</td>
<td>$40 / 28 €</td>
<td>$0.20 / 0.14 €</td>
<td>$2 / 1.4 €</td>
</tr>
<tr>
<td>B</td>
<td>100-400 km</td>
<td>$20 / 14 €</td>
<td>$0.25 / 0.16 €</td>
<td>$2 / 1.4 €</td>
</tr>
<tr>
<td>C</td>
<td>Under 100 km</td>
<td>$5 / 3.5 €</td>
<td>$0.40 / 0.28 €</td>
<td>$2 / 1.4 €</td>
</tr>
</tbody>
</table>

According to the Toronto web site, members get a discount on the Toronto public transportation system.
Car Sharing Portland

Car Sharing Portland was founded in March of 1998. By the beginning of 1999 it had 117 members and 9 vehicles and as of November 1999, 220 members and 13 vehicles, with 12 parking stations around Portland. The rules and routines follow the StattAuto model.

The stated goal is to provide a diverse fleet of reliable, safe and clean cars. The emphasis is on the automobile service.

Some of interesting aspects of CarSharing Portland:

Members pay a refundable deposit of US$ 500 (500 €), but the size of the deposit is reduced to US$ 250 (250 €) if the applicant has a pass on public transportation.

The organisation recommends the club for people who drive less than 10,000 miles (16,000 km) per year. CarSharing Portland provides a worksheet on which people can monitor their current driving patterns and compare costs.

Members are not charged for vehicle use from 11 PM to 6 AM and there is a daily cap of $45 (45 €). According to the organisation, the cap is there in order keep it competitive with rental car companies.

If a car is ordered, but is not there when the member arrives to pick it up, the organisation pays a cab fee to get to the planned destination. If it is due to a late return, the previous user is charged the cab fare.

In a recent survey of members, results showed that members had become more aware of their transportation costs and had begun to change their customary mobility habits by planning vehicle usage more carefully and "bundling" together trips that might have formerly been taken separately. Car sharing also led to significant changes in the use of alternative transportation. After joining CarSharing Portland, individuals took the bus more often, rode their bicycle more and did more walking than they had before.

4.1.3 Asia

NTUC INCOME, Singapore

The NTUC organisation launched its first test of a car sharing system in August 1997. It used cars with an on-board computer and an electronic key box. The test was intended for 80 members, but 150 people signed up. They share four Mitsubishi Lancers.

Two housing areas have now joined the project. When people buy a house they automatically get access to NTUC membership. The organisation plans to have one car for every 40 residents, including a Mercedes Benz limousine and several multipurpose vehicles. Vehicles will be stationed near public transit stations and the housing companies will provide shuttle services to and from the stations (Shaheen et al 1999).

The developers of the two housing areas will cover the membership fees of participants for the first several years of the project. Members will pay only for hourly or daily rental costs and kilometres.
4.2 The station car model.

Although the station car model for car sharing is similar to the StattAuto model, there are two distinguishing characteristics. The first is that station cars are usually electric vehicles. The second is that the placement of station cars is centred around public transit stations and shopping centres, rather than residential neighbourhoods. The placement of station cars makes them convenient for commuting, while StattAuto type sharing vehicles are seldom used for commute trips. The Praxitèle case discussed in section 3 is an example of a station car-type car sharing model.

Much of the momentum for station cars in the United States has come from the formation of the National Station Car Association (NSR), a non-profit organisation founded in 1993 to promote the station car concept.

According to its web site, the NSR has a three phased strategy. Phase I, which ended in 1998, was intended to show that electric cars can accomplish the driving cycle associated with station car service and that a wide range of drivers can use electric cars with no difficulty. A task force, consisting of the American Public Transit Association and the Transportation Programme of the Electric Power Research Institute was established to set up demonstration station car projects around the country. So far, projects have been accomplished in New Jersey, New York, San Francisco and Los Angeles.

In Phase II from 1998 to 2000, the goals are to:

- show the acceptability of the multiple use of cars, i. e., answer the question: will users accept a shared vehicle?
- bring down the costs
- build regional and national teams to begin to commercialise shared electric cars.

In the final phase after 2003, the goal will be to enter the market with a developed service in several regions of the United States.

4.2.1 Car Link, San Francisco Bay Area

Car Link grew out of a demonstration project which ran from 1995 to 1998 with 94 participants and 10 PIVCO electric vehicles. The system tested was similar to that of Praxitèle. Based on the success of the demonstration, the project was expanded in 1999 to 40 electric vehicles including 30 PIVCO City Bees from Norway, 2 General Motors EV-Is, 2 Toyota RAV-4s, and 5 Kewets from Denmark. Car Link is supported by research and commercial organisations, including Honda, BART (the public transportation system for San Francisco), Teletrac, the National Science Foundation, the Partnership for Advanced Transit and Highways, and the University of California Transportation Centre.

Vehicles are traced with an on-board computer which also keeps track of the usage time and kilometres. Members are offered two usage plans, “pay as you go” or monthly subscription. Reservations for cars are made by phone or through the Internet. A smart card system is used similar to that of Mobility, Switzerland.
“Home side” users drive the vehicle between home and the transit station and keep the vehicle over night and on weekends for their personal use. Their monthly fee is $200 (200 €) per month (includes fuel, maintenance and insurance). “Workside” users take public transport to the station nearest their workplace and use the cars to and from work. They are charged a $60 (60 €) monthly fee, but this fee can be shared with other employees who use the same car.

The evaluation of the demonstration project showed that among participants, use of participant’s own cars (cars with internal combustion engine) decreased by 94%. Use of public transport increased by 56%. Emissions were estimated reduced as follows: reactive organic gases 93.5%; nitrogen oxides 98%; and carbon dioxide 90%. There were other non-quantifiable results. Station cars dripped no gasoline, crankcase oil, transmission fluid or coolant onto streets and parking places. The electric vehicles themselves drew a lot of media attention, increasing awareness that EV’s can function as a daily car and that they reduce pollution. At the end of the project, participants were asked about their interest in continuing to use station cars at the home-end, work-end and both. All home-end users indicated that they would continue, while only 36% would want them at the work end.

4.2.2 PowerCommute, New Jersey

The New Jersey Department of Transportation and NJ TRANSIT started testing electric station cars on May 19, 1997 under a programme called PowerCommute. The purpose of PowerCommute was to demonstrate a new train commuting model, the utility of electric vehicles and the benefits of public-private partnerships. The project partners include the state's major energy utility companies--GPU Energy and PSE&G, which have contributed grants for charging facilities. Bell Atlantic NYNEX Mobile has installed cell phones in each Electric Vehicle and AAA Clubs of New Jersey (an automobile association) has provided roadside service. The Project was planned to have a total of 21 EVs at the end of the first year.

PowerCommute enlisted companies to lease electric vehicles for at least two of their employees to drive from the train station to work. Key to the programme is increased rail ridership. Thus employees who normally drive to work were asked to start using transit instead. Inbound or reverse commuting employees used the train and station cars instead of their personal vehicles. After the station-to-workplace commute had been established, employers assigned each car to a local employee. That person drove the car from home to the station, picked up fellow employees, and carpooled to work. Charging facilities were placed at the work location to increase range and make cars available for transportation to meetings and for errands during the day.

PowerCommute vehicles were also leased to the public to drive from home to the train station. Special parking spots with charging stations were reserved for the cars at the station. If a member carpooled to the station, they received free parking. Home charging systems were installed to demonstrate the viability of personal electric vehicle use.

By April 1, 1998, fifteen cars had been placed at the three stations.

Transportation Management Associations (TMAs) enlisted the train riders and corporate sponsors at each of the project’s three locations. A Transportation Management Association (TMA) is a non-profit public/private partnership working to improve mobility, reduce congestion, and give businesses and the public a voice in local transportation issues. They provide services like rideshare matching, customised shuttle services, vanpools, emergency
ride home programmes, transit advocacy, environmental advocacy, and commuting programmes including walking, biking and telecommuting. TMAs also supported commuters through the guaranteed ride home programme and co-ordinated the day-to-day operation.

The results of a recent evaluation and customer survey are not yet available.

4.2.3 Station car projects in planning or set-up stage
(see Shaheen et al 1999 for more details on these projects)

Honda ICVS

In 1997 Honda announced its plans to establish a station car system with four electric powered vehicles located at sites in Motegi, Japan. They are to use an advanced technology card system for retrieving and starting vehicles, and for recording usage. They also have an auto-driving function which allows them to leave and enter a docking port unmanned. As of the writing of this report the system had not yet been put into operation.

Toyota Crayon

Toyota has put a station car system into place to provide automobile transportation to workers at two of their operations in Japan. The system will operate for one year and employ a fleet of 50 electric cars for 300 employees. There are 8 parking sites at the company and the cars can also be charged at the workers home. Toyota plans to monitor usage and charging patterns.

Denver

A car sharing system is planned to connect Denver Airport to ski resorts, using a high speed train in conjunction with station cars at major resort areas.

Orlando

Similar to the Denver scheme, car sharing would be linked to a new light rail network under construction. Station cars would be placed at train stations and at the major amusement attractions around Orlando.

Las Vegas

The city of Los Vegas is considering a plan for station cars to help relieve traffic congestion and pollution.
4.3 Another variant on car sharing: Luftanza Airlines, Frankfurt and Munich airports

The Luftanza car sharing project is a company-based car sharing model started in 1989. The goal has been to reduce total parking spaces for company employees.

There is an automatic rental system in which a computer releases a key and starts the billing. After the car is returned, the vehicle communicates distance travelled and fuel consumed to a central computer system. By the end of 1994, 12,000 employees at the two airports had access to this system. Luftanza has reduced the need for 1250 parking spaces and has saved over 19 million € in avoided parking infrastructure costs (Morias 1994).

A simpler programme, “Car Share” was introduced in 1993 by Swissair at the Zurich airport for flight attendants. It is a technologically simpler system which works together with Hertz. (Wagner 1997).
5. A SYNTHESIS AND DISCUSSION OF NASCENT CAR SHARING EFFORTS

In this section we extract essential information from the experiences to date with car sharing.

5.1 Organisational forms

Car sharing organisations can be divided into the two distinctive organisational forms which formed the basis for the organisation of section 4: the StattAuto-type organisation, in which standard non-electric vehicles are distributed in neighbourhoods in city centres; and the station car model, in which electric vehicles are placed near transit stations, major shopping areas and large companies. StattAuto-type organisations are by far the larger, more widespread and more mature of the two types. Almost all of the station car systems are in the test or initial set-up phase.

Car sharing uses fall roughly into three different categories:

a) Leisure time use by individuals
b) Use by company employees during working hours.
c) Use by individuals in conjunction with commuting

StattAuto-type organisations have mainly aimed at a), while station cars are aimed at uses b) and c). There are efforts among many StattAuto-type organisations to try to capture more b) type uses in order to reduce idle time for vehicles during the day. Station car models in the United States are aiming at eventually capturing a) type uses. In the Car Link model in San Francisco, the organisation is recruiting individuals who will have full access to a single car which they drive home from the commuting transit station after work. Evaluations of both Praxitèle and Car Link show that the most frequent uses were by those who lived near the parking stations.

In the early phases of car sharing, organisations tended to be bottom-up, grass roots organisations, with non-profit charters and idealistic goals. Some continue to operate this way, especially the Scandinavian organisations and a few of the new StattAuto-type organisations in the United States. However, the older and more mature organisations have opted for a more professional profile and more service-oriented goals. All of the largest car sharing organisations (StattAuto, Mobility, DENGELDRIVE) operate on corporate, commercial principles.

Car rental organisations are often compared to, and sometimes classified as car sharing organisations. The differences are that car share vehicles:

- can be rented by the hour
- are available for pick-up during the night hours (24 hour service)
- are new with good ecological standards.
- are placed in the centre of cities, where people live, whereas rental cars are usually placed where big roads cross each other or near stations and airports

Many car sharing organisations and some car rental companies believe that both can benefit from co-operation (elaborated in 5.7 below).
In the Netherlands, Europcar and Budget have initiated services which resemble those of car sharing. Coupons are issued for use of cars for a minimum of a half-day rental. Subscribers are issued coupons which are discounted in relation to the normal rental rate, and they are given a special telephone number to use for reserving cars.

5.2 Goals and marketing strategies

There are three main goals for car sharing organisations: improved environment, mobility efficiency (relieving congestion and parking), and improved mobility service. As indicated above, as organisations have matured, there has been an evolution from an emphasis on environmental and mobility efficiency goals to an emphasis on service. This is reflected in marketing strategies, where today the emphasis is on the improved transport service. The environmental arguments are still used, but the environmental benefits are portrayed more as a consequence, rather than the main purpose of car sharing.

Mobility Switzerland’s marketing and information campaign provides a good example of the messages of mature car sharing organisations. The following is summarised and paraphrased from Mobility Car Sharing Brochure “Car on Call”:

On the road by all means of transportation: car sharing starts where public transportation comes to an end. The car is at your disposal like public transportation, but it can be used like a private car.

Diversified. There is a car for every need, including a runabout car, a family car, a 7 seats van, a goods transporter or a convertible.

Easy and convenient. The car is conveniently booked by Internet or phone around the clock.

Low costs. If you are on the road for less than 15,000 km per year and combine car sharing with public transportation, you can save SFr 250 (156 €) per month compared with owning a car.

Ecologically sound. The combination of public transportation and “car on call” represents the most modern form for mobility, because it allocates resources more efficiently, uses up to 57% less energy and is less harmful to the environment.

Equipped for the future. More and more people pursue greater independence and view traffic from a practical angle. They choose their most suitable means of transport, enjoy changing cars and do not mind driving a car which they do not own.

Note that the first three messages have to do with service, the fourth with economic advantages, and the fifth with the environment. The final message, “equipped for the future”, is designed to give a general “trend of the future” flavour to car sharing.
A good example of the U.S. approach to marketing is that of Car Link, which headlines its marketing strategy: «Car Link - The convenience of a car without the hassles of ownership». From their brochure,

“When too many of us choose to use cars, their benefits diminish. With so many drivers competing for road and parking space, Americans waste millions of hours each year just sitting in their cars, which translates into lost productivity and leisure time, higher stress, and worsening pollution. Furthermore, individual car ownership encourages car use. By the time we pay all the costs of owning a car, we have an incentive to drive as much as possible. Is there a way to get the mobility and flexibility of a car, while reducing the costs to each owner and the impacts of pollution and congestion on society? Car link is a system in which several different people drive the same car throughout a day. Each driver rents the vehicle only for the trip they want to make. Car link offers the freedom, mobility and convenience of a personal automobile, without the expense and hassle of individual car ownership. Enjoy the privacy and instant mobility of a private car, without having to worry about parking or maintenance. Pay as you go; use as you need.”

Again, while the environmental effects resonate throughout the message, the emphasis is on increased mobility efficiency and benefits for the individual.

These trends in marketing, which put service in the foreground and environment in the background are also reflected in the relative involvement of environmental NGOs and automobile manufacturers, respectively. In general, NGO activity and support was high a decade ago but is much less significant today. Car manufacturers, on the other hand, who were at first sceptical, are increasingly asserting themselves into car sharing developments. Many automakers, including Daimler Benz, Volkswagen, and Honda, see car sharing as having a significant growth potential and want to work with it, not against it. Volkswagen conducted a market survey which predicted that car sharing will grow at a rate of 50 percent per year leading to a potential market of 2.45 million shared-use vehicles across Europe by 2005. Another motive for car manufacturers is to improve their environmental image - engaging in car sharing is also a way for manufacturers to project a willingness to explore innovative ways to reduce some of the environmental and congestion problems associated with cars.

Yet another evidence of the increasing importance of the service aspect is the increasing tendency to package a number of services with car sharing, such as discounts on public transportation and for car rentals, as well as providing access to travel agency services, food deliveries, bicycle rentals, and other services.

5.3 A profile of current and potential users

In the organisations which have profiled their members through surveys, a similar pattern emerges. Members tend to be highly educated, in the age group from 30-40, and live in or near the city centre. A number of organisations are making efforts to tap into other market segments, mainly through a new tariff designs, described in 5.4 below.
Commercial businesses and governmental organisations constitute a virtually untapped member category for car sharing organisations. They constitute less than 10% of the membership in a typical StattAuto-type organisation. They are one of the main targets of the station car organisations, but most of these organisations are still in the test or demonstration phase. Of course the exception to this is the businesses which set up their own car sharing plan for their employees, usually with the primary purpose of freeing up parking space (see the Luftanza example in 4.3 above).

One problem with attracting people in younger age brackets is the higher accident rates and accompanying higher insurance rates. As a result, German organisations have set lower limits for entry at 24 years old. On the other hand, Mobility and DENZELDRIVE see the younger market segment as important in spite of the accident issue and are making efforts to recruit younger people. A marketing argument used to attract the younger segment is that they will get access to a wide variety of new cars. Mobility also sponsors driving lessons.

5.4 Tariffs and fee setting

The StattAuto procedure for administering fees is one which has served as a model for new car sharing organisations the world over. Members join the organisation by paying a deposit, returnable on leaving the organisation. A yearly (or sometimes monthly) fee is paid to cover administrative costs. Otherwise, people pay for the time which they use cars and for the distance driven. They are billed monthly.

A recent trend among European organisations and the newer US organisations is to offer a more diversified fee structure. The entry fees range from almost nothing to around 765 €. Use fees are higher for the low entry plan. The idea is to attract infrequent users and also those who do not have access to the higher entry capital. StattAuto offers to act as a bank for new members and to finance the cost of the entry fee. Several options for interest rates and payment plans are made available.

An innovative fee system in Bremen attaches car sharing membership to a monthly pass on public transportation. Purchasers of the monthly pass get automatic usage of the car sharing vehicles without paying deposits or entry fees. The use fees are slightly higher than those for regular members.

Another innovation is the StattAuto cash car plan. Members lease vehicles on a longer term from StattAuto. They have the option to make the car available to other members on weekends or during other peak usage periods. StattAuto and the car leaser share the proceeds from the use of the car.

5.5 Obtaining, maintaining and disposing of vehicles

Some organisations in the start-up phase, having few members and limited capital, lease their fleet of cars from an automobile dealership or agency. This is partly due to the high cost and rapid depreciation of new vehicles. Otherwise, the general practice is for car sharing organisations to purchase their cars and sell them after use. With the exception of Mobility, Switzerland, which buys and sells their cars on the open market, most organisations seek
agreements from a single automobile manufacturer or car dealer for the purchasing, maintaining and selling of vehicles. DENZELDRIVE (Austria) has been purchased by an automobile trading company, so that obtaining and selling vehicles is done through the mother company.

A widespread practice is for organisations to start with a relatively uniform fleet of standard sedans, and as the organisation grows, to diversify the fleet to include station wagons and vans. A few of the larger organisations have added a sports car and luxury vehicle to the fleet.

In the beginning phase, most organisations choose to make one car available for about every 10 members. In general the number of members per car is usually increased as the organisation grows. StattAuto and Mobility have both increased to a member-car ratio of about 25:1. DENZELDRIVE has chosen to keep the ratio closer to 10:1 as it grows, reasoning that while it is more costly for the organisation, the better service will lead to more satisfied members. It should be said that DENZELDRIVE’s relationship with a large, international car trading company gives an advantage over other car sharing organisations when it comes to obtaining cars at reasonable prices.

For those organisations which buy their cars, the practice on when to sell them varies. StattAuto sells their vehicles after two years of use but before they reach 80 thousand kilometres (at which time cars usually enter a phase in which mechanical problems increase dramatically). DENZELDRIVE sells its cars after only a year of use and less than 50 thousand kilometres, opting to go for a higher resale price rather than hold onto the vehicles for a longer period. Again, the relationship to Denzel gives an advantage in the market for buying and selling of cars.

The responsibility for maintaining the general cleanliness of the vehicle is most often given over to individual members. This chore is not always carried out conscientiously, so that a back-up system is needed. Two typical ways of dealing with the problem are to ask for volunteers from the organisation to check and clean vehicles, or to hire students or others willing to do the job for low pay.

5.6 Stationing vehicles

The StattAuto-type car sharing organisations station cars in neighbourhoods around the city centre. Unless deals can be made with the municipality or with other organisations which have parking facilities, car sharing organisations must pay commercial rates for parking. A recent and growing trend is for car sharing organisations to work together with entrepreneurs of new apartment developments, offering residents a membership in car sharing. Cars are then placed in designated parking places at the apartment complex.

5.7 Co-ordination of car sharing with public transport and car rental organisations

Almost every car sharing organisation surveyed has understood the importance of making an arrangement for its members for discounts on public transportation and with car rental organisations. We elaborate this point in section 7.1.4 below.
6. EVIDENCE ON BENEFITS OF CAR SHARING

6.1 Reduction in the number of cars

Cars are idle on average 23 out of 24 hours a day (USDOT 1995). During that time, an enormous physical space is needed to accommodate idle cars. A reduction in the number of cars frees up space for bike paths, sidewalks, green spaces, etc. In Germany, Austria and Switzerland, there are on average 1 car for every 2 inhabitants. Results of evaluations of car sharers in both countries show that members of car sharing organisations have significantly fewer cars than the average inhabitant. For the organisation's shared cars, person to car rations range from 1 car for every 10 members to 1 car for every 26 members. At the same time, many members either sell their private car, or abandon the idea to buy one, when they join. In Mobility, Switzerland, 45% of the members who owned cars beforehand have sold their car after one year, and 60% have sold it after 3 years (Muheim 1998).

In Germany and Switzerland, urban planners are already incorporating into future plans car share parking areas and a consequent reduction in parking areas for private vehicles. Housing companies in Germany, Switzerland and Singapore are building car sharing into their housing concepts, thus reducing the amount of space required for stationing residents vehicles. Similarly, Luftanza has reduced requirements for airport parking space through a car sharing set up for employees.

6.2 The use of newer, smaller cars with higher environmental standards

The cars which are either leased or owned by car sharing organisations are relatively new and on average much more fuel efficient than the average car in use. In addition, on average about 70% of the journeys are with the smallest car in the fleet. Finally, cars are serviced regularly so that they run efficiently. The newness, smaller size and good maintenance mean that car sharing cars emit considerably less pollutants than the average car on the road.

Electric vehicles significantly reduce urban pollution. The station car version of car sharing has a demonstration effect for electric vehicles, introducing them to a new public and testing technical characteristics. The National Station Car Association uses this as one of its main arguments for car sharing – that it puts more electric vehicles on the roads and gives car sharing owners an exposure to using electric vehicles, making them more familiar and less exotic.

In Sweden, STEM, the government directorate for energy efficiency is promoting Flexible Fuel Vehicles (FFVs), which combine fuel cells with standard combustion engines. FFVs are being included in STEM’s market procurement programme, which has earlier promoted energy efficient refrigerators and lighting. The programme solicits buyer consortiums willing to buy energy-efficient or environmental products in order to push market transformation. The Swedish car sharing organisations are participating as co-buyers in the consortium for FFV’s. Car sharing organisations are natural allies for market transformation programmes aimed at more efficient or less polluting cars.

Car sharing reduces the size of the average car on the road. When people buy a car, they tend to size it to their peak need, which could be the weekly shopping trip, the annual vacation, or
the periodic need to carry larger items such as furniture. This means that for the majority of the trips the car is oversized in relation to the trip purpose (see Wilhite and Lutzhenheiser 1998). A member of a car sharing organisation can size the car to the specific nature of the trip, so that large cars are only used when needed.

Trips by car sharers have higher occupancy-rates than trips by owned cars, thus increasing efficiency and reducing the number of cars on the road. In Stattauto, the average trip occupancy rate is 2 persons, compared to the German average of 1,3 persons. In Switzerland, car sharers also average 2 people per car, while the national average is 1.6 people per car (Muheim 1998).

6.3 Reduction in car person-kilometres and consequent reductions in pollutants and CO₂ emissions

There have been measurements of the reduction in person-kilometres associated with car sharing in 4 countries: Switzerland, Germany, Austria and Netherlands. The reductions refer to the driving habits of members before and after joining car sharing organisations. The data is as follows:

- Switzerland, 57% reduction (Muheim 1998)
- Germany, 50% reduction (Baum and Pesch 1994)
- Austria, 47% reduction (Steininger et al 1996)
- Netherlands, 37 % reduction (Meijkamp, R. and R. Theunissen 1996)

The average reduction is about 50%. The relatively lower reduction in the Netherlands might be due to its higher population density and smaller geographical size compared to the other countries.

It Switzerland, it has been calculated that the total effect on energy use, assuming 600,000 participants in Switzerland, is a reduction of 790 million kilometres per year in car driving and a reduction of 3,900 Terajoules per year in vehicle energy use (Muheim 1998).

The study by Baum and Pesch (1994) estimated a potential for 2.5 million car sharers in Germany, which would save 2% of the total person-kilometres for private vehicles.

A report by the Dutch Ministry of Transport in 1993 concluded that car sharing should lead to a what it termed a "massive" reduction in car use. It pointed to a potential for 2 million car sharing users in the Netherlands by 2010 (Bakker 1995 as reported in Harms and Truffer - 1998).

A reduction in CO₂ and most other emissions, including noise, are directly proportional to a reduction person-kilometres. Studies from European countries show that the reduction of CO₂ is somewhere between 0.15 and 0.23 tons of CO₂ per 1000 kilometres of reduced driving, depending on the makeup and age of the fleet. A study by the European Union concluded that car sharing could reduce car mileage in Europe by as much as 32 billion kilometres a year and CO₂ emissions by as much as 5 million tons a year. The other pollutants mentioned in section 2, NOX, CO, and VOCs, as well as the problems of noise and accidents would also be proportionately reduced.
While the station car concept, which uses primarily electric vehicles is still in the test phase and its growth potential less certain, its local environmental effects are unquestionably positive. An evaluation of the Car Link project in San Francisco, estimated reductions among participants as follows: reactive organic gases 93.5%; nitrogen oxides 98%; and carbon dioxide 90%.
7. KEYS TO SUCCESS AND POTENTIAL BARRIERS

In this section, we discuss “key elements of success” and “barriers” to the success of car sharing organisations. In a certain sense, barriers and “success factors” are related in that achieving success often hangs together with overcoming one or more barriers. We have nonetheless found it useful to isolate and discuss both, even though there may be some overlap in the discussions.

7.1 Key elements of success

7.1.1 No major infrastructural changes necessary

The StattAuto version of car sharing constitutes a major innovation in automobility without carrying with it a need for any major infrastructural changes. The roads, petrol stations, automobile technology, etc., can continue to be used in much the same ways. A car sharing organisation can be set up with a minimum of new technology, organisational know-how and capital investment. At the same time, car sharing takes pressure off of expanding infrastructure by reducing the number of cars on the road.

The station car version of car sharing carries with it the need for an infrastructure for electric vehicles, making the start-up more technology- and capital-intensive. Thus a key element of success for the StattAuto-type organisation does not apply to the station car model.

7.1.2 Marketing and information dissemination

Marketing and aggressive information dissemination are important elements in the success of car sharing organisations. Car sharing is a concept which is not generally well known, either by the general public or by governmental authorities. For many people the very idea of “sharing” implies a degraded service and a sacrifice of freedom and independence. Thus marketing and information is needed both to make people aware of the existence of car sharing and to draw out the ways in which it can actually improve the service of automobility for the individual and at the same time reduce problems of pollution and congestion. The marketing of the larger and more mature car sharing organisations reflects a professional approach and positive images attached to car sharing. According to Swiss governmental documents, the marketing message is that the mobility service of the future must satisfy a growing demand for mobility which is simple, inexpensive, comfortable and ecological. The key is to market car sharing as a key element in a package of “combined mobility” which links car sharing with public transportation in creative ways. The marketing message in Switzerland is that “With combined mobility – the third alternative in mobility – there are only winners: clients, public transportation, the environment and also cities.” (Muheim 1998).

For the smaller car sharing organisations in the start up phase, resources for marketing is a problem. Marketing and information is one area in which public support might make an effective contribution.

In addition to the “combined mobility” message, an important element of information is the ways in which car sharing reduces costs for the individual. The costs of a car are determined
by six factors: depreciation, interest costs, taxes, insurance, fuel costs, and repair and maintenance. Only the latter two are related to the actual use of the car (variable costs).

In its information campaign, the National Car Sharing Association (NCSA) in the United States makes a case that because of the idle time of an owned car, it is an extremely unproductive form of mobility. Privately owned vehicles are unused on average 23 hours per day (USDOT 1995), while cars are the third largest investment most families make. A calculation by NCSA for a US home owning household shows typical costs per hour for the following:

Household car: 14,50 $ / €  
Refrigerator: 0,03 $ / €  
Clothes drier: 0,58 $ / €  
Electric heating: 0,33 $ / €  
House (24 hour day): 0,25 $ / €  
House (14 hour day): 0,43 $ / €

The Dutch Automobile Association has come up with a table which shows the percentage of costs for the major factors contributing to fixed and variable costs for average use in the Netherlands.

<table>
<thead>
<tr>
<th>Costs (in average percent)</th>
<th>Compact New</th>
<th>Compact Used</th>
<th>Medium New</th>
<th>Medium used</th>
<th>Large New</th>
<th>Large Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depreciation</td>
<td>41%</td>
<td>37%</td>
<td>45%</td>
<td>37%</td>
<td>48%</td>
<td>39%</td>
</tr>
<tr>
<td>Interest costs</td>
<td>11%</td>
<td>8%</td>
<td>10%</td>
<td>11%</td>
<td>11%</td>
<td>10%</td>
</tr>
<tr>
<td>Taxes</td>
<td>5%</td>
<td>7%</td>
<td>6%</td>
<td>9%</td>
<td>6%</td>
<td>9%</td>
</tr>
<tr>
<td>Insurance</td>
<td>16%</td>
<td>10%</td>
<td>17%</td>
<td>12%</td>
<td>16%</td>
<td>12%</td>
</tr>
<tr>
<td>Total fixed costs</td>
<td>73%</td>
<td>62%</td>
<td>79%</td>
<td>68%</td>
<td>81%</td>
<td>70%</td>
</tr>
<tr>
<td>Fuel costs</td>
<td>23%</td>
<td>28%</td>
<td>18%</td>
<td>25%</td>
<td>17%</td>
<td>25%</td>
</tr>
<tr>
<td>Repair/maintenance</td>
<td>4%</td>
<td>10%</td>
<td>3%</td>
<td>7%</td>
<td>2%</td>
<td>5%</td>
</tr>
<tr>
<td>Total variable costs</td>
<td>27%</td>
<td>38%</td>
<td>21%</td>
<td>32%</td>
<td>19%</td>
<td>30%</td>
</tr>
</tbody>
</table>

Table 7.1. The relative contribution of various cost factors in car usage (Meijkamp 1999)

Thus the total fixed costs range from between 62 – 81% and the total variable costs from 19 – 38%. Of course for those who use the cars much higher than average, the variable costs increase and the profitability of car sharing decreases. Both StattAuto and the Portland CarShare estimate that car sharing is profitable for the individual car owner if the kms driven per year come to less than around 16000. In Portland, the calculation is as follows for a new small sedan:

<table>
<thead>
<tr>
<th>Kms driven per year</th>
<th>4500</th>
<th>9000</th>
<th>16000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car Sharing ($/ €)</td>
<td>1007</td>
<td>2038</td>
<td>3700</td>
</tr>
<tr>
<td>Car Ownership ($/ €)</td>
<td>3173</td>
<td>3363</td>
<td>3734</td>
</tr>
</tbody>
</table>

Table 7.2. Costs of car sharing and car ownership measured against car usage (source Portland car sharing).
A calculation done by the Norwegian Newspaper Verdens Gang (28 April 1998) showed that for an average Norwegian car (price about 18,100 €), driven 15,000 km per year, it would cost the owner 5,440 € per year or 15 € per day. The included costs were: depreciation, loss of interest on sunk capital, insurance, yearly public fee, maintenance, gasoline, oil, tires, servicing and repairs. A member of the car sharing association could use a car 26 weekends per year (300 km per weekend) and one weekday per week (30 km per day) at a yearly cost of 2950 €, almost half that of the car owner. The article pointed out that up to 2418 € could be used for taxis before one came in balance with the cost of car ownership.

These efforts at making the cost of car ownership and use more transparent are important in the marketing and information efforts of car sharing organisations.

### 7.1.3 Coalition building

In order to grow and prosper economically, car sharing organisations must seek coalitions with other organisations which have an interest in mobility. The most obvious are the public transport and car rental organisations (discussed below). Other important partners for the future are public organisations responsible for urban planning. In Bremen, in the Netherlands and in Switzerland, urban planners are building parking stations into the future plans for city development. Housing developers are also an important future partner. In many places around the world, new housing communities join together with car sharing organisations to offer memberships in car sharing. The need for parking space is reduced and occupants get the economic benefits of avoided car ownership.

### 7.1.4 Co-operation with other mobility organisations.

Experience from many parts of the world is that co-operation between car sharing, public transportation, taxi and rental organisation is in the best interests of all. Evidence from situations in which there has been co-operation shows that car sharers increase their use of public transport, taxis and car rentals. Thus these forms for mobility are not competitive, but rather are mutually reinforcing.

![Diagram](image)

**Figure 7.1.** Car sharing fills a mobility gap, complementing other forms for personal transport (after Glotz-Richter 1999)

The figure above shows how car sharing fills a mobility gap on a flexibility-distance scale. Flexibility means easily accessible, flexible routing and flexible carrying capacity. Taxis are very flexible means of transport, but are expensive for longer distances. The bicycle and
public transport are less flexible than a private vehicle. Car rentals are more flexible than public transport but are not economically efficient for short distances. The car sharing vehicle is flexible and is suited for intermediate distances. Thus there is some overlap with other means of transport, but also a unique niche which none of the other transport means fills efficiently.

Four car sharing organisations have monitored the changes in public transport practices. Changes are indicated in the following table.

<table>
<thead>
<tr>
<th>Car Sharing Organisation</th>
<th>Consequence for public transportation (PT) of co-operative agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>StattAuto (Berlin)</td>
<td>Increase from 30% of all trips by PT to 40% of all trips by PT among members</td>
</tr>
<tr>
<td>[Members get Smart Card for use on PT and a 15% discount on monthly pass]</td>
<td></td>
</tr>
<tr>
<td>StadtAuto (Bremen)</td>
<td>An increase by 24% of season pass clients who buy annual, as opposed to monthly, passes</td>
</tr>
<tr>
<td>[Purchase of an AutoCard gives PT season pass holders access to car share vehicles]</td>
<td></td>
</tr>
<tr>
<td>DENZELDRIVE (Austria)</td>
<td>An increase of 1.2 million kilometres of PT journeys among members</td>
</tr>
<tr>
<td>[No special discount or agreement]</td>
<td></td>
</tr>
<tr>
<td>Mobility (Switzerland)</td>
<td>A change among members from 20% of all journeys by PT to 80% of all journeys by PT</td>
</tr>
<tr>
<td>[Discounts on seasonal PT passes and pass holder access to car share vehicles, plus a half-price pass on Swiss rail system for car share members]</td>
<td></td>
</tr>
</tbody>
</table>

Table 7.3. Consequences of car sharing on the use of public transportation

There is also evidence that discounts and other forms for agreements on public transportation have a positive effect on car sharing memberships. An example is Switzerland, where car sharing began to take off in Switzerland in 1996, when car sharing, rental car and public transport were integrated. Within 6 months, 3,500 new members joined Mobility, a significantly higher enrolment than in the previous 6 months (Muheim 1998). The Car Share Portland organisation is trying to attract public transport seasonal pass holders by offering them a 50% discount on the membership deposit.

Agreements with car rental organisations are also important. Practically speaking, car rental provides a way for car sharing members to satisfy their longer distance mobility needs. It also provides the organisation a way to help alleviate weekend peaks in demand for cars. Rental car companies generally have different markets, focusing on business users, tourists and accident replacement cars, while the car sharers focus on residential use. Rental firms usually require minimum one day use. Rental car location tends to be at an airport or at a cheap location on the edge of town, while car share parking lots are spaced around. Rental car companies have on the whole decided to co-operate with, rather than compete with car sharing organisations. Car renters sometimes use rental cars on the weekends in the peak periods. In DENZELDRIVE, car sharing members have increased their use of rental cars by 200,000 person-kms. The Baum and Pesch (1994) study of all car sharing organisations in Germany showed that members had almost doubled their use of taxis after joining.
Many of the major rental car companies are showing an active interest in car sharing. According to Harms and Truffer (1998), who interviewed representatives for Hertz in Switzerland, Hertz reported that they saw car sharing as an opportunity, not a threat. Hertz sees a great growth potential for car sharing and sees a linking of the two, since car sharing has different clients.

7.1.5 Professional approach to operational aspects

In almost all of the more mature organisations discussed above, there is a recognition that professionalism in organisation, practical routines, service and marketing are essential to member loyalty and to growth. As the study of the Oslo organisation spelled out, even the most idealistic of members state clearly that their continued participation depends on the efficient management of the reservation system, car placement, billing and other practical aspects of the organisation. In fact one of the main reasons for joining was to leave behind many of the practical problems associated with owning a car (also found to be true among Stadtauto, Bremen, and Mobility members). Meeting a new set of problems is discouraging.

The failure STAR (San Francisco) reinforces this point. Sound business practices and a professional approach to the organisation were sacrificed for idealism. The rate structure was not set high enough to cover expenses. Cars were not well maintained and the reservation system did not work smoothly.

A European study of non-car sharers found an image of non-professionalism to be one of the principle reasons for not participating. Car sharing organisations were said to have an unprofessional image, an insufficient variety of products and services, higher prices than public transport, a system that was perceived to be “complicated, impractical and time consuming”, and vehicles that were not readily available near home (Shaheen et al 1998). This image needs to be corrected if car sharing is to reach a larger public.

7.1.6 A creative approach to service.

It is important that car sharing organisations distinguish themselves from the other mobility options. Creative service offers can contribute to this. Some of the creative services provided by the organisations we have reviewed are:

- Discounts on car rentals and public transport.
- Co-ordination of seasonal passes on public transport with car share memberships.
- Access to a wide variety of vehicles.
- The service derivatives of the smart card chip technology: easy access (no need for key boxes), visual display of kilometres under way, direct reporting of kilometres (no need for log books), direct billing.
- Allow members access to travel information and to book journeys on other forms for transport.
- Allow members to take up to three other people with them on public transportation (the virtual car)
- Allow female members to deliver cars on the morning after night use to avoid walking home at night.
7.1.7 Certification by public authorities.

The Swiss and German organisations see government recognition of car sharing as one of the important next steps in its evolution. This would have an effect on a number of important issues. One of them is criteria for deciding when an organisation qualifies to be designated as a car sharing organisation. For example, do two families sharing a car qualify? And what differentiates car rental and car sharing organisations? Second is a legitimising effect. Government certification would generate trust and reduce the attitude that these are non-professional, fly-by-night organisations. Third, it would allow local government, commercial and non-profit organisations to provide benefits such as designated parking or tax advantages.

The awarding the Blue Angel environmental certification is seen by many as an important step in the further development of car sharing in Germany. Criteria have been established for defining car sharing, and the awarding of the certification will have the legitimising effects described above.

7.2 Barriers

7.2.1 General

There are several barriers which lie in the background for all of the organisations we have reported on. One is a general problem for alternative transport solutions, which is the positive macro-economic association of transport growth and economic growth. More cars, more roads and more infrastructure to support them have been positively valued in the indices constructed to reflect economic growth. An organisational form which has the consequence of reducing the number of cars is valued negatively. Another potential barrier is the automobile industry itself, though as we have reported, many manufacturers are exploring ways in which they can be a part of the emerging car sharing industry, rather than block the development. Finally there is the firmly rooted idea of the car as a part of the modern family. This can perhaps only be dealt with through the growth and increased visibility of car sharing, coupled with the marketing of the “mobility service” of car sharing as a better, less expensive and more modern alternative to car ownership.

7.2.2 Access to parking

A recurrent theme in experiences from many parts of the world is that finding places to station vehicles is a problem. There is heavy competition for parking spaces in many cities of the world. This means that deals must be struck by the car sharing organisation with either the municipality, apartment complexes, commercial businesses or other enterprises in order to secure parking stations at reasonable rates.

In Germany and Switzerland there are new initiatives which may help reduce this barrier. One is the Blue Angel certification, which will allow city governments and other organisations to either dedicate or discount parking for legitimate car sharing organisations. In the Netherlands, city planners are building parking stations into plans for future city development. And in several parts of the world, building contractors and entrepreneurs are linking apartment ownership to car sharing and providing parking for car share vehicles.
7.2.3 Coping with uneven demand (variable load)

One of the biggest problems for car sharing is dealing with the peak demand for cars on weekends, particularly in the summer months. This is the source of an economic problem, since the income generated from car use is low in off-peak periods. It is also the source of a customer satisfaction problem when cars are not available to meet members needs.

Car sharing organisations have dealt with the problem in one or more of several ways. The first is the development of more sophisticated models for predicting demand (for example, StattAuto and Mobility), based on past practice, weather, holidays, etc. This allows for more efficient availability and placement of vehicles. The second is to make an arrangement with a rental car agency to make some of its cars available to the car sharing organisations during peak periods. A similar tactic is for the car sharing organisation to help its members to make reservations for rental cars. The new Cash Car programme by StattAuto is another initiative designed to make cars available on weekends. Cars are leased to members under the condition that they make the leased cars available for use by StattAuto on weekends when they are not using the car. Income for the rental is shared by StattAuto and the lessee.

7.2.4 Access to capital

As with any business, the start-up phase for a car sharing organisation presents economic challenges. A decade ago organisations were forced to generate capital through loans and membership deposits. Today, outside investors are more inclined to participate in the financing of new car sharing organisations. An example is the new organisation in Belgium, where the local organisation is only planning to put up one fourth of the capital. The remainder will come from public transport (1/4), the automobile sector (1/4) and from a foreign car sharing organisation (1/4).

These three sources of capital reflect trends which should make financing less problematic in the future. Public transportation organisations see the potential for co-operation with car sharing as does the automobile industry. In addition, the large car sharing organisations like StattAuto and Mobility see the possibility for using their accumulated know-how and capital as investments in new organisations.
8. ISSUES PARTICULAR TO FRANCE AND ALTERNATIVE FORMS FOR GOVERNMENT SUPPORT

This section examines key elements of success and barriers to the development of car sharing in the French context. Where appropriate, possibilities for government support are recommended.

8.1 Transportation and environmental policy in France

Transportation is one of the sectors where France can act to follow up on the Kyoto agreement, since the majority of electricity generation does not result in greenhouse gas emissions. Moreover, the Law on Air Quality (1996) provides a favourable framework for reducing car use. The elaboration of "Plan de Déplacements Urbains" (PDU: discussed in more detail in 8.2 below) has started discussions on mobility management, a concept which is not yet used by all decision makers in the field of transportation (see the CERTU 1999 document which states that according to national and foreign observers, France is very much present on technological issues, but very much less so on mobility management).

In the transportation sector, the tendency has been to address problems through the use of supply side solutions. In order to have a more efficient public transportation system, public authorities raise the supply; likewise, to resolve congestion problems, public authorities develop new infrastructures for private cars. The latter favours car ownership and provides disincentives for car sharing.

There is also a tendency in France to favour centralised solutions, because of the centralised French political and decision making structure. Car sharing to date in France has been the result of a "bottom-up" development, whereas France is better known for "top-down" developments, including technological developments such as the TGV. The State often plays an organising role in these developments, at a minimum allocating R&D funds in accordance with government plans. Moreover, strategies based on the influencing of demand are not usually given serious consideration, because they are perceived as too complex to implement (too numerous and diffused entities) and to have marginal effects. This applies thus far to car sharing, but also in approaches to managing electricity demand. Perceived as "marginal", demand-side solutions do not have credibility. The reasoning seems to be that if car sharing can not be suitable for all private car users, it is not worthwhile considering.

But would the results be that marginal in France? Our analysis in sections 6 and 7 reveal considerable evidence that the potential market is significant. In addition, there has been a study of the potential for France, using the hypotheses of a German study (Cerit, 1999). Although the exercise is somewhat hypothetical due to differing conditions in France, the result is interesting: the market potential is predicted to be 1.7 million users, who would share 85,000 cars (20 persons using a car). If it is assumed that 10 of 20 are car owners when subscribing to the service, and half of them abandon their car, the resulting substitution is about 1 shared car for 5 private cars. This means these 85,000 cars could replace 425,000 private cars and would reduce the total car numbers by 340,000 cars. This number also represents a third of the paying parking places in France. In terms of reductions in person- and car-kms, 1.7 million users reducing their travel by 2,800 km per year would generate 4.8 billion car-km savings and to 9.6 billion person-km (using a two person per shared car ratio),
representing 1.5% of France’s person-kms per year. These results present car sharing as a credible alternative which might make a significant contribution to automobility problems in France.

According to results reported in sections 3 and 4, and also concluded by Certu (1999), the French position thus far on car sharing seems to be out of line with that of other European countries. In addition, knowledge about foreign experiences is not widely diffused. Apart from the PDU, there are no real political incentive to develop such alternatives to private car use, and there are only few independent initiatives (such as half a day rent of electrical cars in La Rochelle and Strasbourg, a few examples of electrical cars rented by traditional car renters with attractive tariffs, one car shared in Toulouse by 20 persons, and the start of Caisse Commune in Paris). There is little demand for this new service, which may be explained by the fact that constraints in terms of traffic and parking are still bearable. However, there is evidence of increasing pressure on local governments from traffic-related problems. This is born out in extract from Newspaper Le Monde (date 19/11/99) entitled "The city of Bordeaux is suffocating because of automobile traffic." The article reports that the traffic in Bordeaux has almost doubled in 10 years. JB Rigaudy, Director of the regional urban planning agency states: "when it comes to the car, the very foundation of the French society is touched. As long as car retains its fundamental importance, and as long as there are no coercive measures in terms of police and taxes to limit automobile traffic, nothing will really change".

Government support will be needed because it is not possible, nor desirable, to go totally against today's situation, where freedom of movement is linked to the possession of a private car, especially without proposing satisfying alternatives, so that people can chose the most suitable transportation means according to the purpose of the travel. This support would first come through a strong political will to manage mobility and urban traffic, illustrated by various activities: adaptation of the regulatory framework (fuel tariff, parking organisation, etc.), encouraging partnership with public transportation, information dissemination, incentives providing an advantage to car sharers (parking places, priority line, etc.), and penalties for private car users. Car sharing would benefit from the internalisation of external costs of the private car, making it easier to get dedicated parking places, integrating car sharing in more general urban plans, and assistance with information dissemination and communication.

8.2 Reinforcing key elements of success

In this section we discuss how the key elements of success of section 7 might be reinforced or supported in France.

- **Information dissemination**

There are two kinds of information which are important: 1) on the existence of car sharing, which is difficult for fledgling organisations such as Caisse Commune in Paris and 2) on the advantages of car sharing, such as the reduced automobility costs for both individuals and the community. Public authorities could assist in assisting with the dissemination of both. An example of how this might be done is in conjunction with the issuing of the drivers license. Another opportunity is in conjunction with the “In town without my car?” day in September of each year.
• **Coalition with urban planning**

The general legal framework for transportation and urban planning has evolved considerably since the Law on air quality and rational use of energy (December 1996). It is an evolution in which car sharing could find governmental support. The most notable requirement is the obligation for cities above 100,000 inhabitants to develop a PDU. These PDUs define the main lines of action for the organisation of both person and goods transportation. They aim at: reducing automobile traffic; developing public transportation and efficient/pollution free transportation means (bike and walk); fitting out streets for a more efficient use, organising parking; reducing impacts of goods transportation on traffic and environment; and encouraging firms and local authorities to use public transportation and develop car pooling. PDUs have to be consistent with other frameworks such as the Regional plan for air quality, or the “Schema Directeur” (which decides for regional development options). The Law on air quality states that urban development and legal documents such as POS (Plan d'Occupation des Sols) will have to be consistent with the guidelines defined by the PDU.

If the example of the Île de France PDU is taken, it is unfortunate that car sharing seems to be absent of the final text (which is now undergoing a final public review—“Enquête publique”) whereas it was studied in previous drafts. One recommendation about parking encourages the expansion of private parking in residential building complexes in order to free up street parking (it is already quite a common practice in Paris is to force buyers of newly constructed apartments of more than two rooms or 50 m² to buy the parking lot with it). This requirement gives a positive signal regarding the possession of a car and is contrary to tendencies in other European countries. It could be turned around in the future by encouraging or requiring that new residential buildings provide space for car share vehicles. In smaller cities, or areas where PDUs are not yet published, mayors who are deciding on the POS (Plan d'Occupation des Sols) of their cities could be informed and trained on sustainable parking policies, such as limiting private spaces in residential and commercial building while providing alternatives such as car sharing stations in residential buildings, or public transportation solutions for commercial buildings.

• **Coalition with other mobility organisations**

Information needs to be spread about the complementarity between car sharing and other transportation means. This would ease the involvement of all the partners in the development of car sharing (this is strongly linked to the creativity and the attractiveness of the service: the more partners, the more possibilities). The RATP is showing interest in Paris through its partnership with Caisse Commune, though the support seems to be light in the starting phase.

According to some of the interviewees, in France there seems to be a widespread conception that transportation is made of two universes, that of the private car and that of the public transportation system. Even though modal transfers are more and more mentioned, these universes tend to fight without admitting a common border. Any hybrid containing elements of the two, or a linking of these two universes has not been seriously considered.

On the other hand, a contention that car sharing has been totally ignored in France would not be true, even if this support has not been on a large scale; for example, Caisse Commune is drawing both support and attention from a lot of actors (among which are Ademe, DRE, CERTU, GART, INRETS, Paris City, PREDIT, RATP, Renault and STP). However, this
support has thus far been limited, as if supporters were waiting for positive results before getting really involved.

- **Professional service**

Caisse Commune has been advised by other car sharing organisations abroad to establish itself as a corporation (as opposed to an association - their previous status) and to immediately begin to seek commercial businesses as clients, instead of waiting until load management difficulties emerge. Commercial clients have been targeted in their first commercial brochure.

- **Certification**

Car sharing needs to be acknowledged through a specific definition (and probably a French language expression) so that it can be taken seriously into account when transportation policies are developed. Here again the opportunity was not taken in the elaboration of the Ile de France PDU (Plan de Déplacement Urbain), where car sharing was studied but seems to have disappeared from the latest version to be agreed upon in the beginning of 2000.

- **Staying close to the familiar**

People are used to a certain kind of service from their private car, and if this is to be replaced, the service should be convenient and familiar. In France, the Praxitèle experience in Saint Quentin was from the beginning both technology and investment intensive. The promotion of two innovations at the same time (car sharing and electrical vehicles), may be cost effective as an experiment, but is a strategy which may slow the growth of car sharing. Moreover, one could see in this development choice a "typical" French tendency to view an innovation as compulsorily technological, and not consider organisational changes as innovations.

**8.3 Addressing the barriers.**

In this section we discuss to what extent the potential barriers of section 7 apply in France, and where appropriate indicate actions which might reduce or eliminate barriers.

- **Indicators**

Transportation indicators exist, but mainly have to do with numbers, sizes, fuel efficiencies and other dimensions of the car fleet and car use. Mobility management and other service oriented indicators could be developed and used in French transport policy.

- **Automobile industry**

The main French automobile manufacturers are participating in the French car sharing experiences, which means they intend to be part of this evolution. However, they seem so far to be most interested in testing and demonstrating technology (Renault participated in the Praxitèle experiment and pushed GLP for Caisse Commune cars).
• **Access to capital**

In the start-up phase, car sharing organisations need both money and know-how. The latter is a possible area in which the French government could support new organisations, providing subsidies for training and/or software.

• **Access to parking**

French Cities could play an important role in easing this problem for car sharing organisations by setting aside designated parking areas. However, there is a concern that if parking places are attributed on the streets and surface parking areas, as opposed to an underground watched parking, difficulties could arise concerning whether attributed areas are respected by other cars. There is evidence for this from the problems in respecting the designated parking areas for disabled persons. There is also a risk that key boxes could be broken into.

• **Managing uneven demand**

Car sharing in France could benefit from foreign experience in this field. For example the Italian government will probably buy a developed car sharing load management software, translate and adapt it to the Italian context before providing it for cities which intend to develop car sharing.
9. CONCLUSIONS, RECOMMENDATIONS, AND PROPOSAL FOR FURTHER STUDY

Based on this assessment and review of car sharing, we can draw several unequivocal conclusions:

First, there are definite and measurable societal benefits to be derived from car sharing, the most notable being the reduction in the number of cars in the urban areas in which it is implemented, and an approximate 50% reduction of the total number of kilometres driven among its participants. In addition, car sharing cars are on average newer, smaller and more fuel efficient than the urban average.

Second, there is evidence from a number of countries that car sharing does not take market shares from either public transportation, taxis or car renting. On the contrary, there have been increases in public transportation, taxi and car rentals in every city in which these have been assessed. These four modes of transport form an intermodal alternative to car ownership. The car sharing member weighs the mode of transport according to the nature of the trip.

Third, from the point of view of the individual, there are a number of benefits. Car sharing is cheaper than owning a car for urban dwellers who drive less than 1000 - 1500 km per month, depending on the prices of the costs of owning and operating a car. The car sharing system turns fixed costs (insurance, parking, maintenance, repair, road fees) into variable costs. The car sharing member is released from the responsibility for fees and maintenance and is freed of concern for damage and thefts. The member has access to a range of different kinds of cars, so that the vehicle can be chosen to fit the task.

Finally, there are no significant negative consequences of car sharing which we have been able to identify. It does not require significant changes to or investments in infrastructure, nor does it necessitate a change in automobile technology. A study in Germany predicted that there would be no net loss of jobs related to the growth of car sharing. A French study using many of the same assumptions as the German study, came to the same conclusions on the effects on employment in France. We have pointed out that car manufacturers themselves, which might be hypothesised as the greatest losers from a growth in car sharing, have shown an interest in participating in, rather than working against car sharing in a number of countries.

In section 7 we identified several success factors and a few barriers and in section 8 discussed ways in which government intervention might reinforce the former and reduce the latter. A barrier which was not specifically identified and discussed, but is nonetheless relevant, is a general scepticism to the idea of sharing cars in societies in which the notion of private ownership is so powerful. Thus far, this scepticism has existed everywhere where the notion of car sharing has been introduced, but as is the case with many innovations, the scepticism has tended to diminish as the idea spreads and people experience how it works in practice. There is no reason to believe that would not also be the case in France.

So far the growth potential of car sharing has been estimated to be only a few percentage points in the countries where this has been investigated. Two studies in Germany, one by an independent research institute and another by Volkswagen, both predict a potential of 2 - 4% of the German population. The same order of magnitude was arrived at in a study by the
Ministry of Transport in the Netherlands. In Switzerland, 600,000 (9% of the population) are either strongly or reasonably interested in car sharing and Mobility thinks it can capture 12% of the market share of drivers. Since the total environmental effects of car sharing will depend on its growth, an important task for France will be to begin to explore the size of the potential market segment.

The growth of the station car version of car sharing, which has received the most attention in France thus far, will likely be slower because it involves a double innovation. The first is sharing a car with others and the second is using an electric vehicle. If the government’s goal with car sharing is the introduction of an electric-based supplement to the public transportation system, then the idea of station cars makes sense. If there is also an interest in capitalising on the environmental potential of car sharing, it might be wise to further explore the ways it can support the development of the StattAuto-type system.

Our conclusion from this survey of car sharing around the world is that it is a growing phenomenon with positive environmental benefits and as such deserves further investigation regarding its implementation in France. Such an investigation should include the following elements:

- A clarification of the ways in which car sharing might be supported by French transport and environmental policies and if so, what would be the specific goals.
- An identification of which forms government support should take
- An exploration of ways in which car sharing and public transit could benefit through specific forms of co-operation
- A study of the sociological considerations relevant to the implementation of car sharing in France, some of which include: how to encourage a rethinking and reorganisation of concept of mobility, a mapping of which institutions should be involved and how they might contribute; an investigation of user acceptance and how it could be bolstered. The latter point could be related to:
- A study of the market potential for car sharing in France
10. REFERENCES


University of Twente (NL) for DG XII European Commission. 1998. Strategic Niche Management - SNM - as a tool for transition to a sustainable transport system. Seville, Institute for Prospective Technological Studies.


