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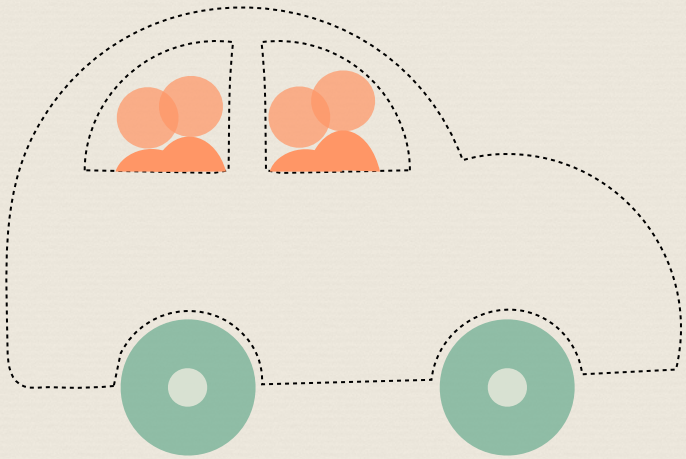
CARPOOLING
FOR A BETTER WORLD



INDUSTRIAL ANALYSIS REPORT

Global Manufacturing Strategy

Tsinghua University

2015

« BY SHARING WE STAND PREPARED TO BUILD RELATIONSHIPS AND GIVE WINGS TO HUMANITY. »

KISHORE BANSAL

A GROWING MARKET

The market of carpooling is much diversified. It include the individual user who shares his car with his colleagues, the student who user carpooling to have cheap travels and the one who use it to reduce his impact on environment.

We can group these different actors in the following categories:

- **Usage for daily travels**
- **Usage for long travels**
- **Carpooling organization inside a company**
- **Business companies proposing carpooling**
- **Institutional carpooling systems**

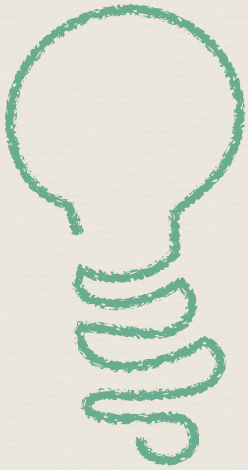
REAL IMPACTS OF THE ENVIRONMENT

Even if this is not the first motivation of carpoolers, reducing the number cars on the road will reduce the pollution.

By taking the decision to use carpooling, the users can contribute to the protection of the planet.

This awareness regarding the environment is also a motivation for the companies to propose carpooling services for its employees and encourage them to reduce the CO_2 emissions at their scale.

NEW TECHNOLOGIES



Dynamic carpooling consists on managing a continuous access to the carpooling available offers. A real time access is provided through a continuous updating of the offers and the demands

The popularization of smartphones, tablets, connected devices, free access to the Wifi, GPS, 3G, 4G, the 'in real time" became totally possible and accessible for all people.

Then the implementation of decentralized systems like Multi-Agent Systems (MAS) or Blockchain will help the market to grow. The objective of these Agents is to successfully associate the different users through an optimization process subjected to several, complex and variable constraints.

PUBLIC POLICY AND SOCIAL ASPECTS

The market is highly dependent on the public policy and the social awareness. If these two aspects could be an opportunity, some public politics are obstacles for the development of this kind of markets.

Due to the high competition in the transportation industry, some countries prefer to protect the classic market from this kind of activities.

This IAR will study the differences of Law and Culture in different countries to try to highlight the points that are going to help this market.

About Autors

Massine AKILAL

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Introduction

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Objective

Even if this is not the first motivation of carpoolers, reducing the number cars on the road will reduce the pollution.

By taking the decision to use carpooling, the users can contribute to the protection of the planet.

This awareness regarding the environment is also a motivation for the companies to propose carpooling services for its employees and encourage them to reduce the CO_2 emissions at their scale.

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Introduction

Concept of Carpooling

Carpooling is an option whether or not own or drive a car. If someone know that travel the same route as a neighbor or co-worker, consider arranging to carpool or ride-share. Carpooling is seen as a more environmentally friendly and sustainable way to travel as sharing journeys reduces carbon emissions, traffic congestion on the roads, and the need for parking spaces. Authorities often encourage carpooling, especially during high pollution periods.

Carpool commuting is more popular for people who work in places with more jobs nearby, and who live in places with higher residential densities. Is significantly correlated with transport operating costs, including gas prices and commute length, and with measures of social capital, such as time spent with others, time spent eating and drinking, and being unmarried. Is significantly less likely among people who spend more time at work, older workers, and homeowners.

Carpooling over the years

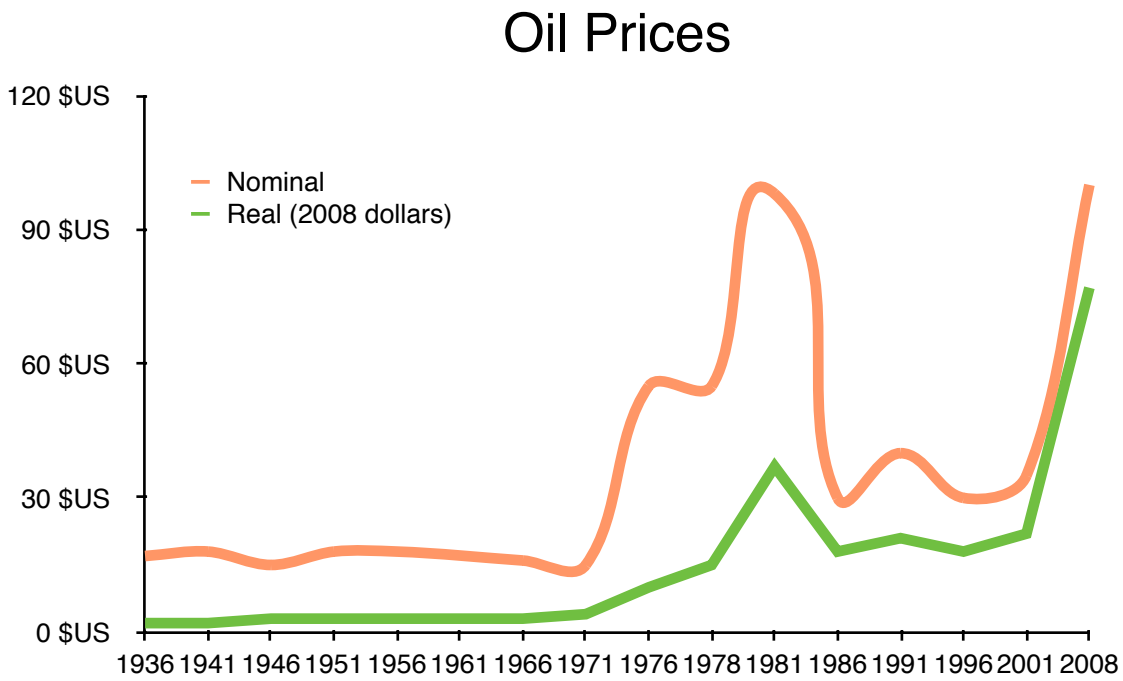
World War II car-sharing clubs (1942-1945)

Focus on conserving resources for the war. Car sharing clubs exchange and self-dispatching system. Matched riders and drivers via bulletin at work.

Fig. 1 Propaganda for Carpooling during the Second World War. Sources: Oregon State Archives, US Archives and Records Administration

Major responses to the energy crises (1970-1980)

Grew significantly in the 1970s in response to the energy crisis and the Arab oil embargo of 1973 to 1974. Focus on conserving fuel. Employer and government sponsored ridesharing projects.



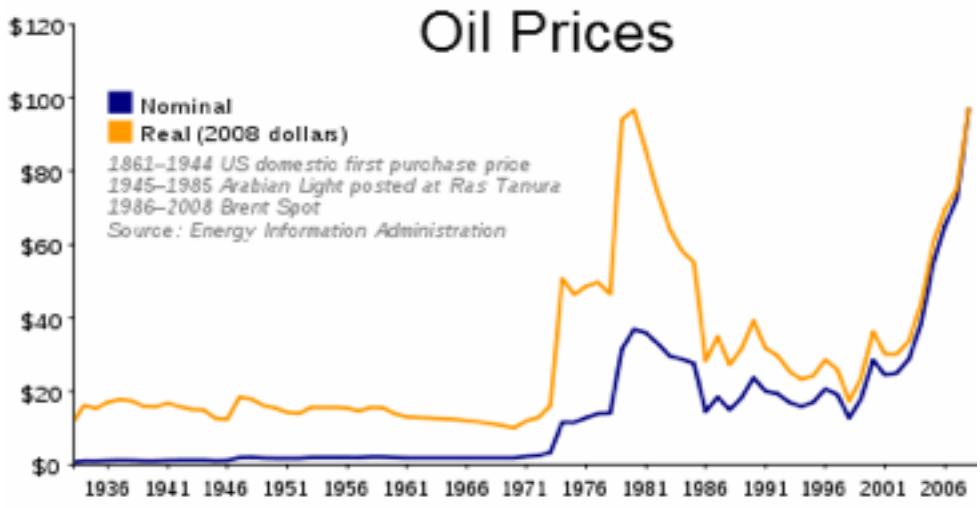


Fig. 2 Graph of oil prices during the years. (Wikipedia oil crisis 1973)

Fig. 3 Cars wait in long lines during the gas shortage in 70´s

Early organized ride sharing schemes (1980 - 1997)

Focus on mitigating traffic congestion and air quality issues. Telephone based ride matching.

Reliable ride sharing systems (1999 - 2004)

Focus on mitigate traffic congestion. Online ride matching services. Traveler information services.

Technology-enabled ride matching (2004 - to present)

Focus on reducing climate change. Financial incentives for "green trips" through sponsors. Growing dependence on foreign oil and traffic congestion. Partnerships between ride matching software companies and regions and large employers. Internet, mobile phones, and social networking platforms. Real time ride sharing services.

Part 1: Market Analysis

This period encompasses the fifth ride sharing phase, called: "technology-enabled ride matching". In this period is most notable for the widespread integration of the Internet, mobile phones, and social networking (i.e. an online community where individuals connect and interact) into ride sharing services. At present, the majority of North American ride matching services use online websites as their chief technology medium. Many of them are based on a ridesharing software platform purchased from a private company. As of July 2011, there were approximately 12 such companies in North America that offer this software. (E.g. Ecology and Environment, Inc. offers Green Ridew, and Pathway Intelligence Inc. provides Jack Bell Ride-Share). While the abundance of online ridesharing systems is promising, it has resulted in disparate, non-standardized databases that leave many programs with a lack of critical mass.
There are approximately 638 ride matching programs in North America.

As of July 2011, the authors estimated that there were 638 ride matching services in North America, based on an extensive Internet search. This tally includes both online (most have an Internet-based component) and offline carpooling and vanpooling programs. Those located in sparsely populated rural areas, which appeared to have very low use, were excluded. Institutions that have their own ride matching website but employ a common platform were each counted separately. Of the total, 401 are located in the USA, and 261 are in Canada (24 programs span both countries). Carpooling attracts the largest focus, with 612 programs offering ride matching, and 153 providing vanpool ride matching; 127 offer both.

Market size and Growth

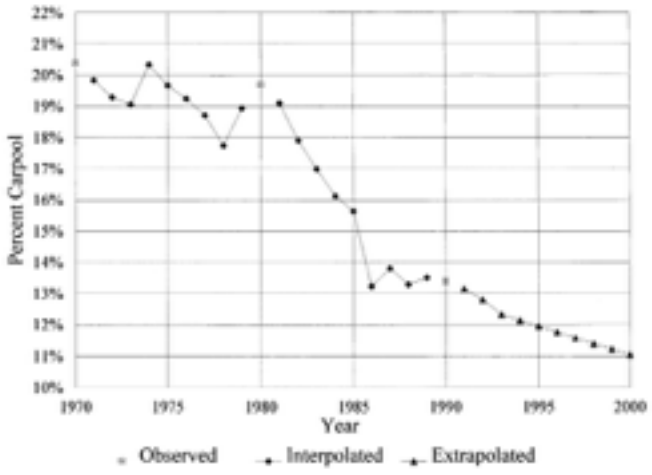


Fig. 4 Interpolated and extrapolated carpool trends in the United States 1970-200. Source: The rise and fall of the American carpool: 1970–1990, Erik T. Ferguson & Associates, P.O. Box 888729, Dunwoody, Georgia 30356, USA

International Comparison of Work Trip Mode Share							
Nation	Personal Vehicle, Driver	Personal Vehicle, Passenger	Public Transit	Walked	Cycled	Other	Carpool & Public Transit
United States	78.2%	12.6%	4.7%	3.0%	0.4%	1.0%	17.3%
Canada	73.8%	6.9%	10.5%	6.6%	1.2%	1.0%	17.4%
UK	62.0%	8.0%	14.0%	11.0%	4.0%	1.0%	22.0%
Australia*	71.0%	7.6%	8.5%	4.7%	1.2%	7.1%	16.0%

Fig. 5 International comparison of work trip modes shares. Sources: US Census, 2000 Journey to Work, StastCan, 2001 Commuting Patterns of Canadians, UK DfT, 1999 National Travel Survey, ABS, 2001 Census of Population & Housing

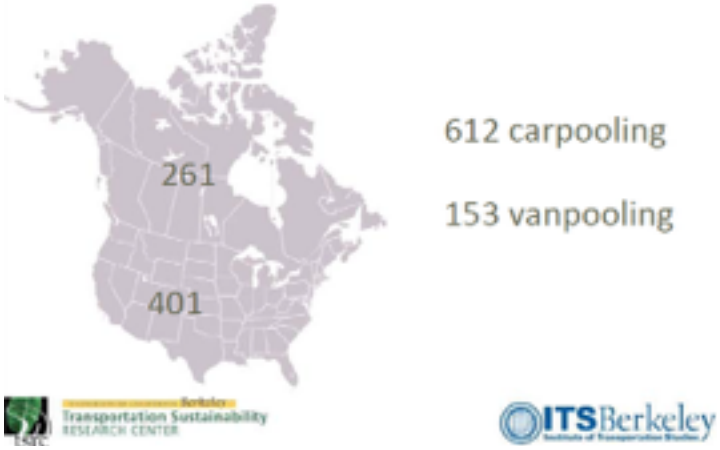


Fig. 6 North American Ride matching Services (July 2011). Sources: ITS Berkeley, Transportation Sustainability Research Center

Ride matching platform partnerships

From 2004 to the present, a new generation of ride matching platforms has been developed for regions and employers to use. Moreover, there has been significant growth and overall success with this strategy. Partnerships between ride matching software companies and its large-scale clients take advantage of existing common destinations and large numbers of potential members. These firms sell their ride matching software "platforms" to public agencies and employers, which are sometimes used as standalone websites for each group. While this partnership strategy has gained more users than previous ridesharing phases, it is most suited for commuters with regular schedules.

"Green trip"-sponsored incentives

Many public agencies and companies promote ridesharing by providing its members with incentives. One example is NuRide—an online ridesharing club with over 63 000 members in seven US metropolitan areas (NuRide, 2011). NuRide rewards points when members carpool, vanpool, take public transit, bike, walk, or telecommute for both work and personal trips. These points can be used for restaurant coupons, shopping discounts, and attraction tickets. NuRide partners with public agencies, employers, and businesses to sponsor the incentives. Similarly, RideSpring works with employer commute programmes and participating employees can enter monthly drawings for prizes from over 100 retailers (RideSpring, 2010).

Social networking platforms

The rise of social networking platforms, such as Facebook, has enabled ridesharing companies to use this interface to match potential rides between friends or acquaintances more easily. These companies hope that social networking will build trust among participants, addressing safety considerations. One example is Zimride, which has partnered with 86 US and Canadian colleges, universities, and companies that each has their own "network" of members (Zimride, 2011). In addition to each network's website, Zimride also uses the Facebook platform to attract public users. Another service is PickupPal (2011), with over 156 000 members in 120 countries. It allows members to create their own groups based on common area, company, school, and shared interests. However, social networking may limit itself by relying on more isolated groups and excluding less tech-savvy users. At present, there are four major North American ridesharing programmes focused on social networking: GoLocoTM, Gtrot, PickupPal, and Zimride.

Real-time ridesharing services

In North America, two companies are beginning to offer real-time ridesharing services: AvegoTM and Carticipate. Real-time ridesharing uses Internet-enabled "smartphones" and automated ridematching software to organize rides in real time. This enables participants to be organized either minutes before the trip takes place or while the trip is occurring, with passengers picked up and dropped off along the way. These programmes attempt to address the inconvenience of traditional carpooling and vanpooling. As in most ridesharing services, a high subscriber base is required. These key developments and their target journey purposes are summarized in ´Table 3.

Some companies

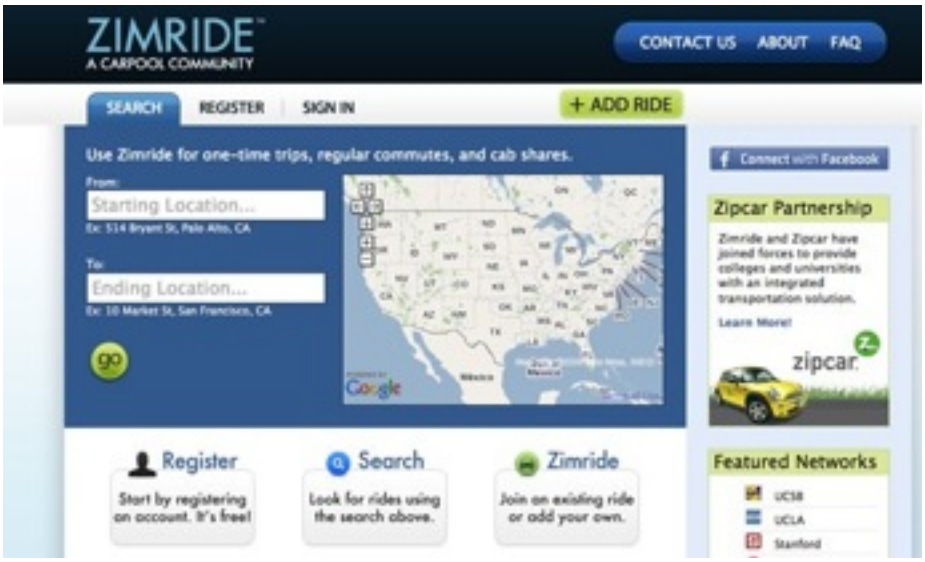
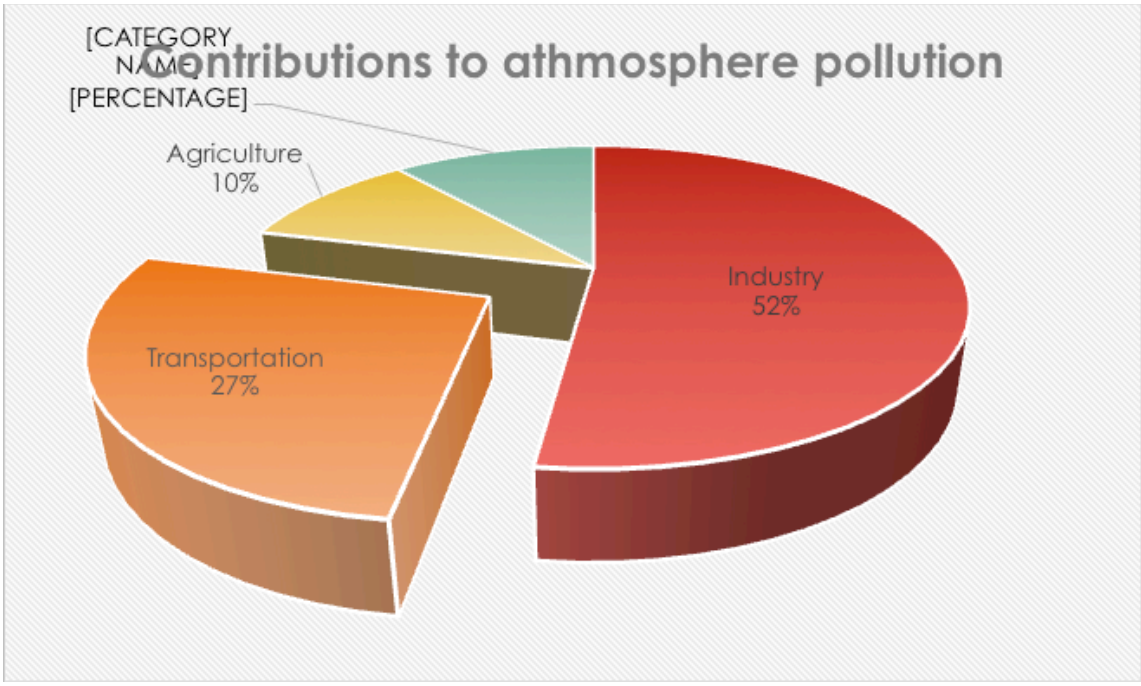


Fig. 7 Zimride.com: Ridesharing with Facebook (USA

Fig. 8 Nuride.com

Part 2: Transportation Analysis

Environment Impacts



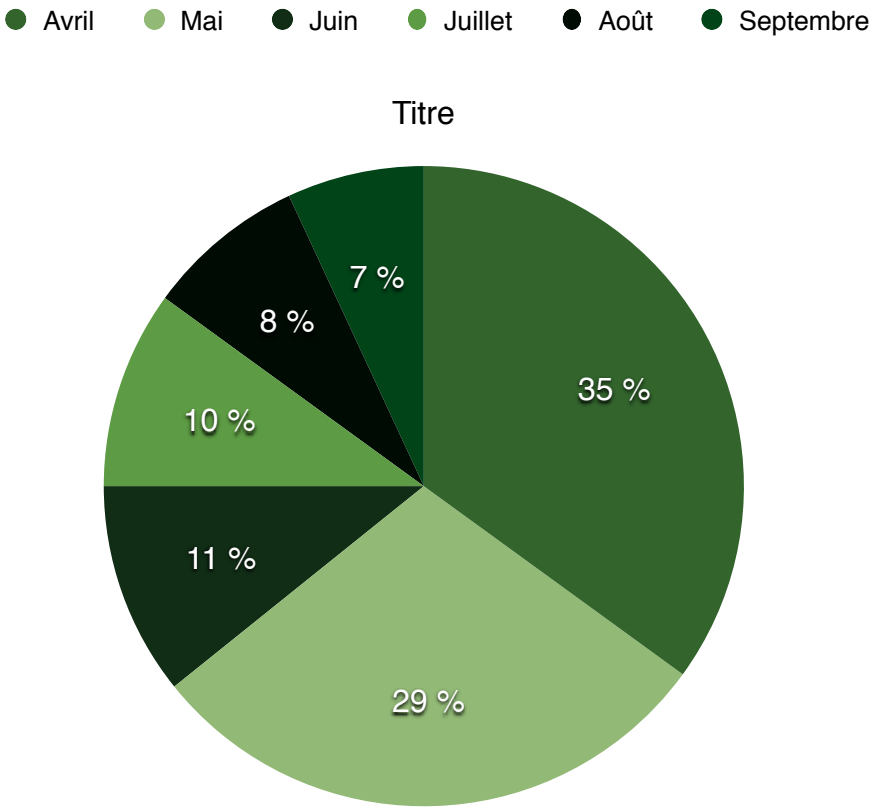
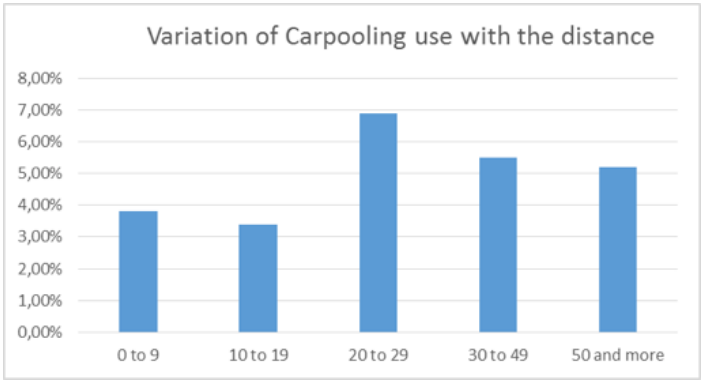


Fig. 9 Contribution on transportation to the atmosphere pollution. Source http://www.ec.gc.ca

The part of atmosphere pollution due to the transportation is very high in the big cities. For these areas, we consider that the transportation by road is the first responsible of emission of NOx and PM10 particles. The process of emission of those particles is:

- The VOC (Volatile organic compounds): those particles are emitted directly from the exhaust of cars.
- NOx: some of those particles are emitted by the engine and some others are produced by chemical reactions in the atmosphere due to the NOx emitted.
- PM10 and PM2.5 are emitted or created by the VOCs. There volatility is due to the traffic.

In this part we are going to calculate the ecological impact of using carpooling. We are limiting our study of ecological impact to the CO2 emission during the travels. Our statistics are collected from the last ENTD (a French study which is made each 10 years to know how French people are traveling). The study was made with a sample of 20200 representative households of the national (France) tendency.



Those figures are showing that the most important use of carpooling is related to travels between 20 and 30 km.

Fig. 10 Variation of Carpooling use with the distance. Source ENTD 2010

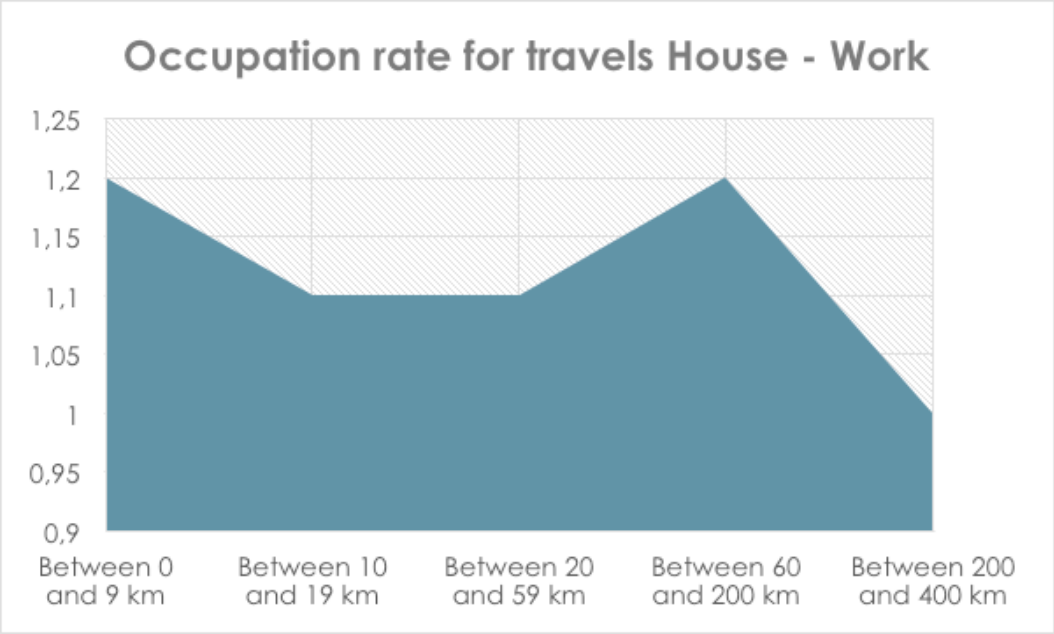


Fig.11

Variation of occupation rate for a type of travels. Source ADEME 2013

Shot Distance Trips

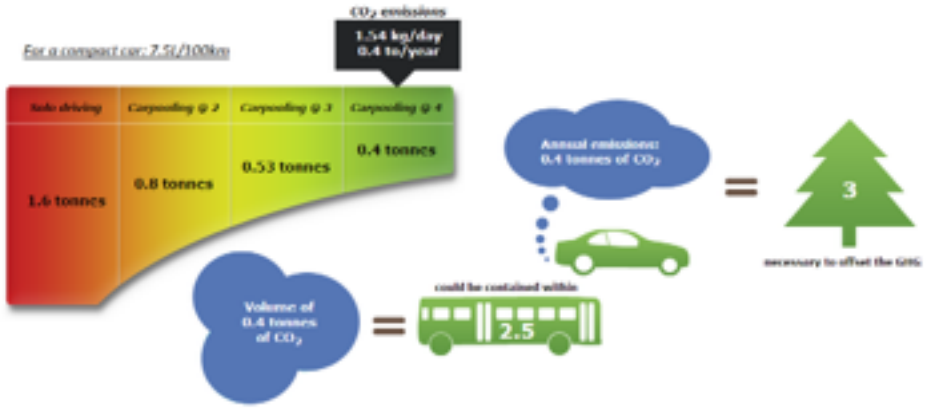


Fig. 12 CO2 Emissions for different scenarios with small car. Source Canadian ministry of transportation

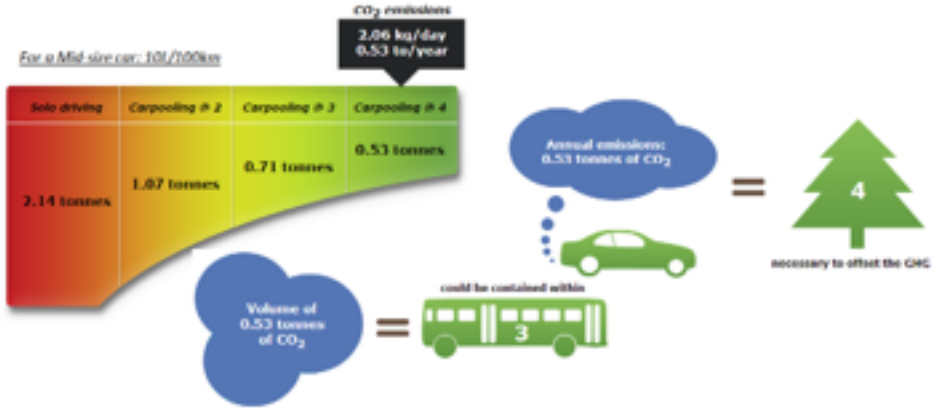


Fig. 13 CO2 Emissions for different scenarios with medium car. Source Canadian ministry of transportation

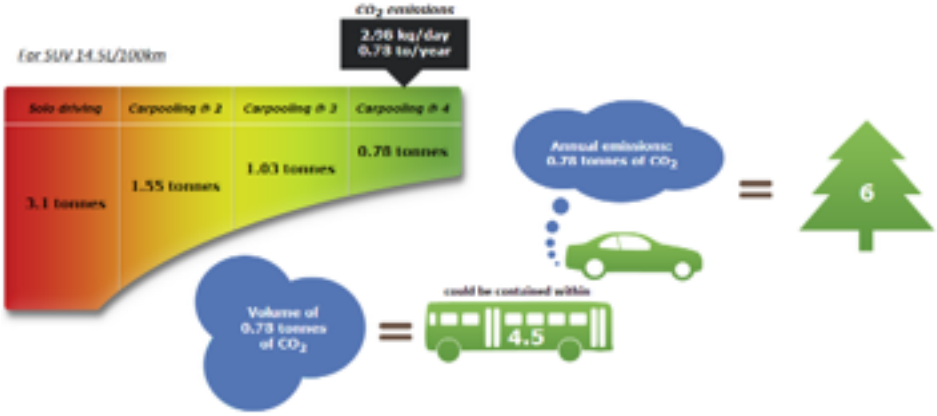


Fig. 14 CO2 Emissions for different scenarios with SUV. Source Canadian ministry of transportation

We learn from ENTD's figures that, the mean distance between house and work place is 14.7km.

This simulation is made for:

- round trip
- 5 working days per week and
- 52 working weeks in the year.

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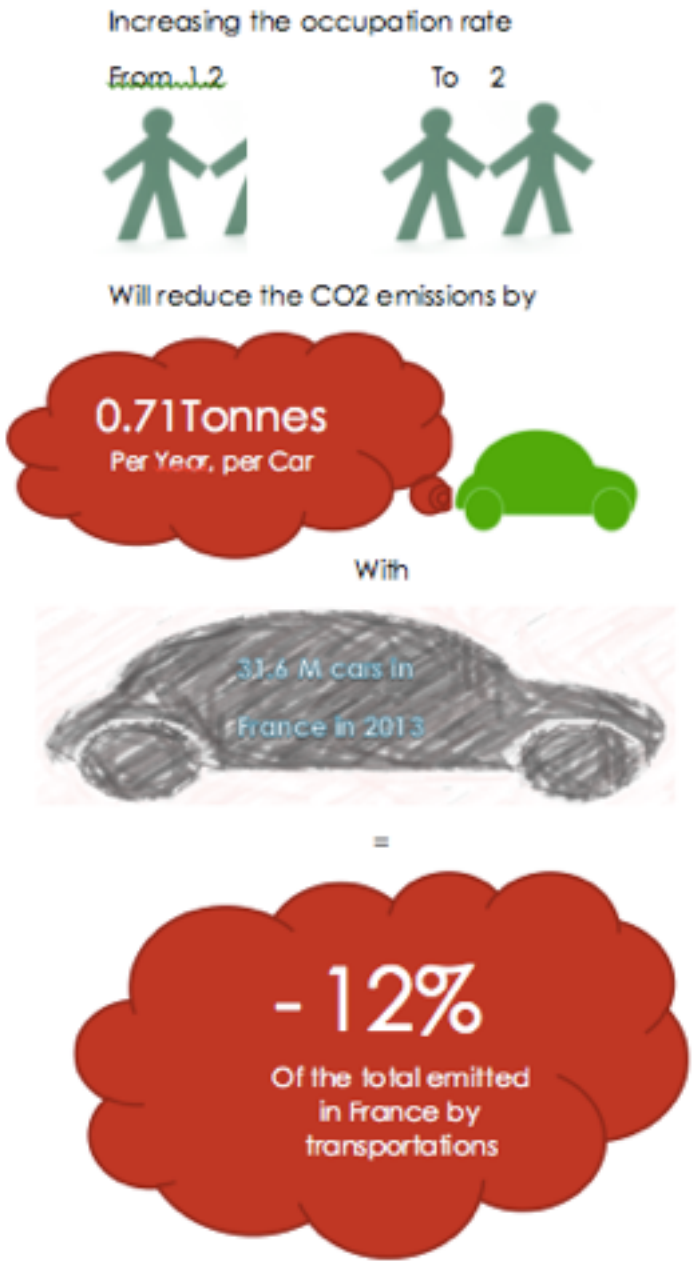

Long Distance Trips

From the previous part, we estimated the emission due to short travels and the potential to reduce this value.

Regarding the percentage of long distance trips, and by ponderation operation, we estimate the total reduction of CO2 emissions in France

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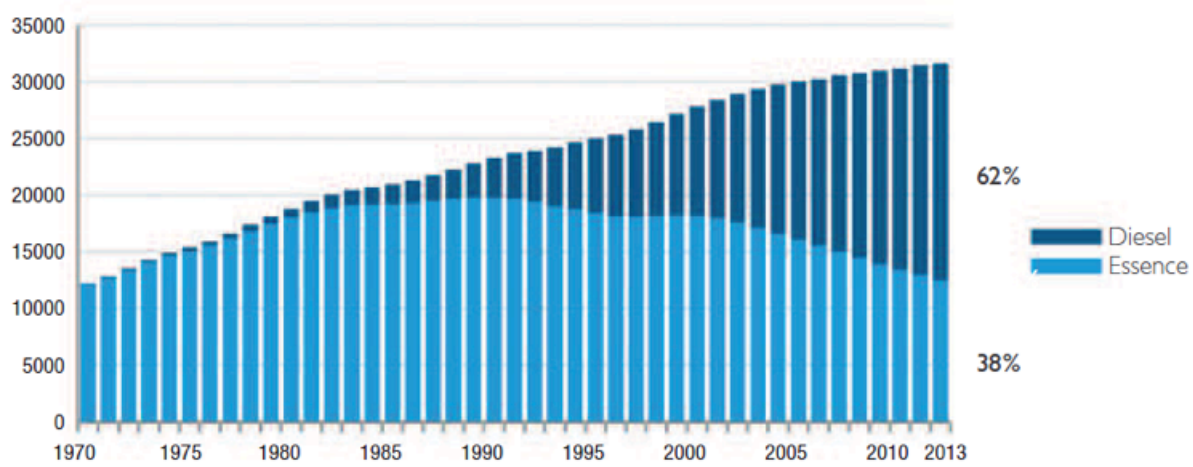
Transportation Cost



Source: SOeS - «Comptes des transports» - Juillet 2014
Champ: France Métropolitaine

Traffic Flow

Part 3: Technology Analysis

Used Technologies

Limited Possibilities

Technologies to boost the market

Part 4: Law and Public policy

Countries Examples

January 2014: Beijing first city legalizing carpooling
Carpooling: reduce carbon emissions + number of vehicles on the roads
Price of carpooling should not be expensive
With Carpooling, government want to

France

The Directorate General for Competition, Consumer Affairs and Fraud Control (DGCCRF) points out in a press release of February 7, 2014 , that carpooling is permissible under the condition that it is free or that the money paid by people transported corresponds to a cost sharing generated by the use of the vehicle.

USA

The Directorate General for Competition, Consumer Affairs and Fraud Control (DGCCRF) points out in a press release of February 7, 2014 , that carpooling is permissible under the condition that it is free or that the money paid by people transported corresponds to a cost sharing

Government Actions

HOV Lanes

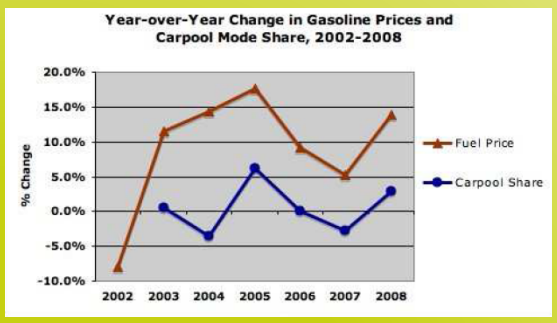
High Occupancy Vehicle Lanes

Restricted traffic lane reserved at peak travel time or longer for the exclusive use of vehicles with a driver and one or more passengers.

HOV Lanes

All over the world

Oil Prices and Carpooling



Motivations for Carpooling

Factor	Frequency Selected	% of Total (N=789)
Sharing vehicule expenses	703	89
Access to HOV lanes	699	89
Enjoy travel with others	691	88
Travel time saving	690	87
Preferred parking at work	687	87
Help environment and society	684	87
Carpool partner matching program	680	86
Encouraged by program at work	677	86
Drop off kids at school/day care	674	85
Reliabilityy of arrival time	666	84
Slitting tolls on toll roads	159	20
Other	109	14
Get work done while traveling	79	10
Relaxation while traveling	77	10

Reasons for not Carpooling

Main Reason	Frequency Selected	% of Total (N=789)
Location and schedule limitation	1682	55
Travel flexibility	1394	45
Need a vehicule during the day	1190	39
Need to make other stops during trip	862	28
Appreciate alone time	567	19
No program to encourage me	417	14
Other	248	8
Like to listen to radio that others do not	175	6
Potential partners have disagreable traits	125	4

With who you carpool

Type of Carpooler	HOV2	HOV3+
	Frequency	Frequency
Adutl family member	335	94
Coworker, nearby office building	141	51
Child	91	95
Casual carpooler	22	14
Neighboor	17	10
Other	33	7

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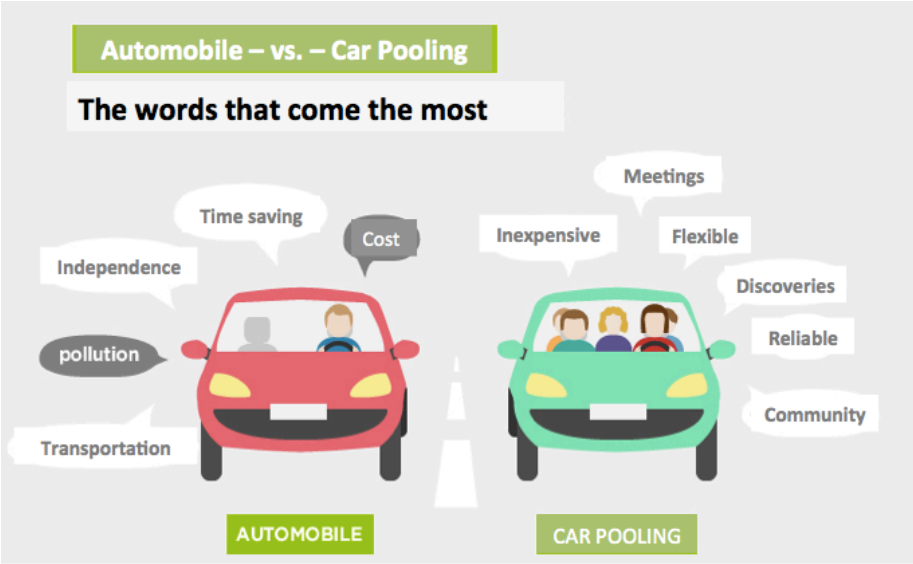
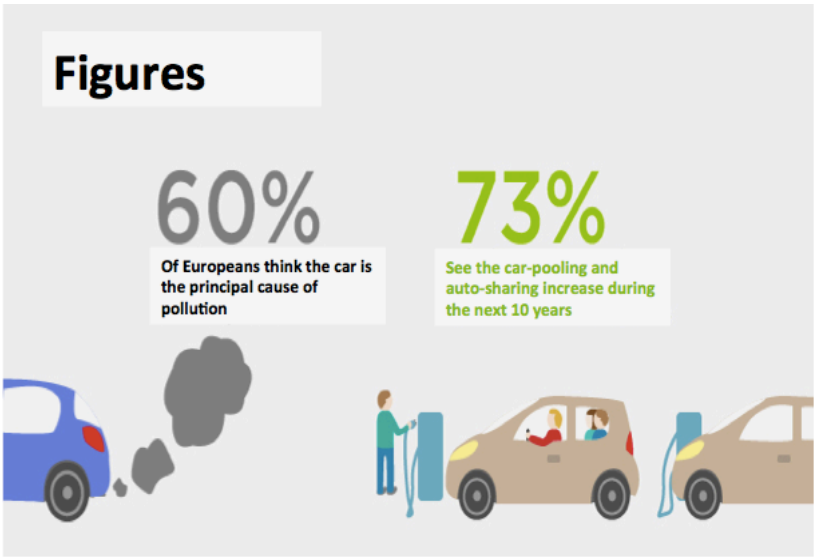
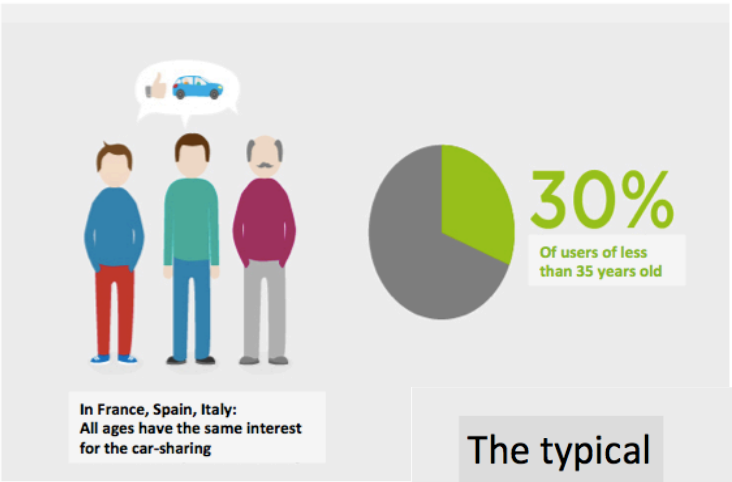

Automobile – vs. – Car Pooling
The words that come the most
Time saving
Cost
Independence
pollution
Transportation
Meetings
Inexpensive
Flexible
Discoveries
Reliable
Community
AUTOMOBILE
CAR POOLING


Figures
60%
Of Europeans think the car is the principal cause of pollution
73%
See the car-pooling and auto-sharing increase during the next 10 years


30%
Of users of less than 35 years old
In France, Spain, Italy:
All ages have the same interest for the car-sharing


The typical profile
High level of education
Active on social networks
Young

Part 6: Challenges

Conclusion

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Appendix

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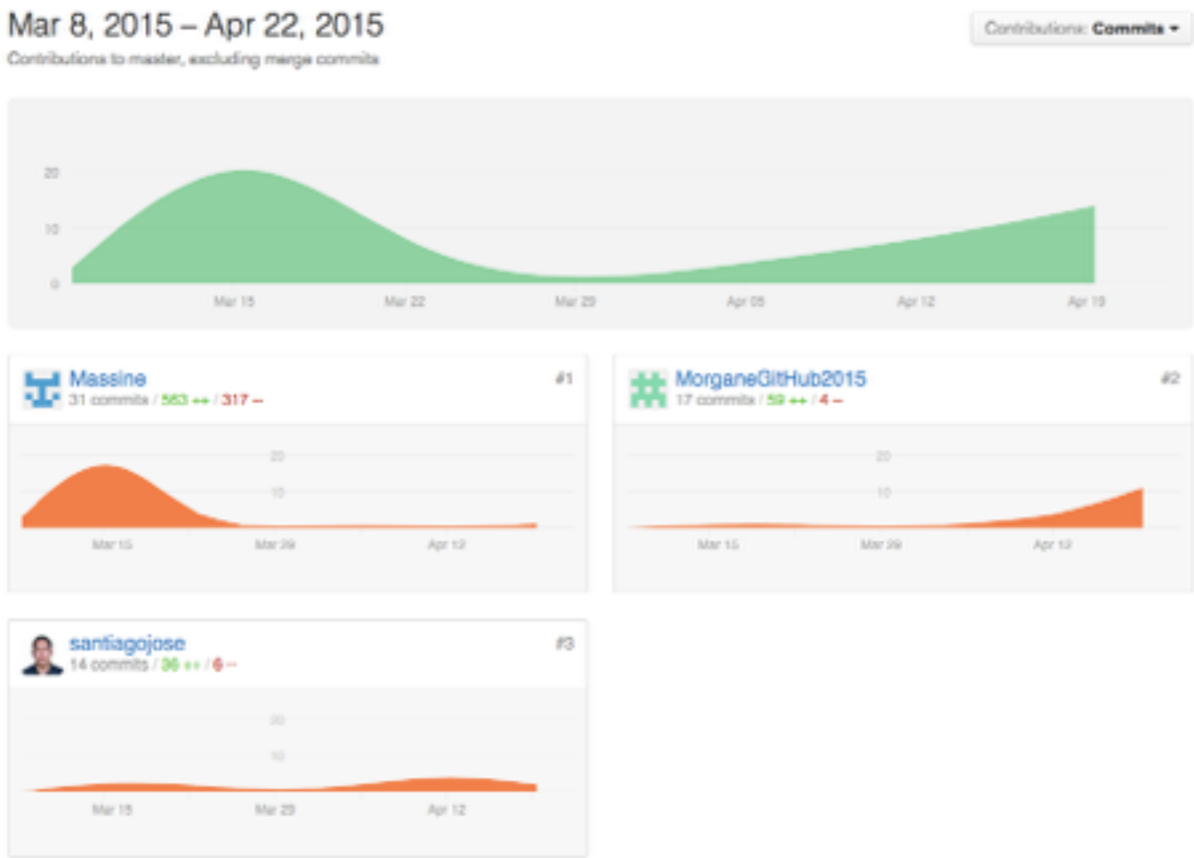

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