Overcoming barriers to energy efficiency in household mobility: a Swiss survey among key players of politics, economy and NGOs

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Abstract  
Road transport is at present the sector with the second largest energy consumption in the EU. CO₂-emissions grew by 20% between 1990 and 2000. To curb this growth, measures such as road pricing and reduced speed limit have been tried out and technological improvements have led to significantly better energy efficiency in car motors. However, strong counteracting trends reduce the expected results, among them increased car weight, bigger engines, and more passenger miles. Thus, to reach more energy efficiency in mobility, a change in behaviour is of primary importance.

This paper identifies, in the first part, the relevance and strengths of the barriers for an energy efficient behaviour in the context of household mobility. In the second part, it asks the question of how these barriers can be overcome by activities from key players (political authorities, energy producers and NGOs) and other campaigns directed towards individual consumers and households. It concludes by identifying the main drivers for behaviour change.

The paper combines institutional and individual perspectives on consumer behaviour related to energy consumption. It studies both individual and institutional factors and also examines how both may interact in influencing behaviour.

The empirical basis of the paper is a qualitative stakeholder survey that was conducted in Switzerland (among six other European countries including Hungary, Norway, France, the Netherlands, and the United Kingdom. The trans-national survey is carried out in the context of the EU FP7 project BARENERGY (Barriers for energy changes among end consumers and households).

Introduction  
OVERVIEW  
This paper is based upon the background research and results of a qualitative stakeholder study that was conducted as part of the EU FP7 Project, BARENERGY. The purpose of the project is identification of the relevance and strength of barriers to energy efficient behaviour in various areas of household energy use, and then how these barriers can be addressed and overcome by various stakeholders. For one part of the project which is presented in this paper, we specifically chose to look at transport as a form of household energy use since it accounts for about one third of all energy use in Europe. Thus, improvements in transport energy-efficiency could have a large impact on overall energy consumption and the emissions associated with that consumption. There are two important areas where improvements could be made, the first being changes in use patterns of energy consumption, and secondly, purchase of energy-efficient technologies. Within the area of transport, we divided the topic into four subcategories which addressed the issues of use and purchase. The first three topics we will focus on in the results section address barriers to use of more energy-efficient technologies or practices; as three examples, we chose barriers to increased use of public transport, barriers to decreased use of cars for short distance trips, and barriers to increased use of car-sharing. For the issue of purchase, the ex-
ample chosen was barriers to purchase of energy/fuel-efficient vehicles.

Following this brief introduction, which will next include an overview of the Switzerland’s current stance on general energy policies and transportation energy policies specifically, the paper will address the theoretical framework and methodology upon which the project was based. These will be followed by a discussion of the results (including the relevant barriers, and possible future actions by stakeholders to overcome those barriers), and will finally conclude with an overview of lessons learned and next steps to be taken.

OVERALL TARGETS AND POLICIES

The Energy Article (Article 89) in the Swiss Federal Constitution, the Energy Act, the CO2 Act, the Nuclear Energy Act and the Electricity Supply Act are the main instruments of Swiss energy policy.

The Energy Article was added to the Swiss Federal Constitution only in 1990. Since then, all cantons have drawn up their own energy legislation and regulations. With the enactment of the Energy Act and the Energy Ordinance on 1 January 1999, the Federal Council fulfilled the mandate it received following the approval of the Energy Article in 1990.

The CO2 Act entered into effect on 1 May 2000. Its objective is to reduce the emission of climate-relevant carbon dioxide (CO2) arising from the combustion of fossil oil by 10% versus the 1990 level by 2010. This means that the consumption of heating oil must be reduced by a total of 15% and of transportation fuels by 8%. The targeted reduction of CO2 emissions is primarily to be achieved through voluntary measures by companies and private individuals. The relevant legislation provides that the federal government may introduce a steering tax on fossil fuels (CO2 tax), if the voluntary measures fail to produce the desired effect. The CO2 Act provides that high-consumption companies, large-scale consumers and consumer groups can be exempted from the CO2 tax if they undertake to restrict their CO2 emissions to a certain level and subsequently meet their declared target.

Because the voluntary measures have not led to a sufficient decrease of CO2 emissions, a CO2 tax for heating oil has been introduced in January 2008. Regarding transport fuels, trade and industry have committed to reducing 9 million tonnes of CO2 over the period 2008-2012 though the “Climate cents” initiative (KlimaRappen). As a consequence, all petrol and diesel imports are charged at a rate of 1.5 cents per litre. The revenue from this tax is to be invested in emission trading and climate protection projects in other countries, while another portion is for climate protection measures within Switzerland where at least 1 million tonnes CO2 needs to be reduced. If the “climate cent” does not have the desired effect by 2012, the Federal Council has the option of introducing a CO2 tax also on transport fuels.

Currently the revision of the CO2 Act for the time after 2012 is discussed. Switzerland will probably follow suit of the EU which decided to reduce greenhouse gases by at least 20% by 2020 (UVEK, 2008).

TRANSPORTATION ENERGY

Mobility accounts for around 35% of Switzerland’s energy consumption and in 2005 totalled 287,910 TJ (Figure 2). Passenger transport performance in terms of kilometres per person per year has been increasing since 1970 (Figure 1).

Especially in the motorized road transport sector the increase is uninterrupted. Besides the increasing number of vehicles, the rise in fossil fuels is also due to increased driving performance, average vehicle weight, air conditioners, and stronger engines, especially in Sport Utility Vehicles (INFRAS 2003).

The total amount of energy consumed in transport can be divided into petrol, diesel, kerosene and electricity use, according to the transport modes that is used. Since 1990, total energy consumption in transport has been on the rise, with a slight decrease in use of petrol in favour of diesel, as seen in Figure 2.

The yearly infrastructures expenditures for individual transport/ streets amount to 3,500 to 4,500 million CHF (about 2,243 to 2,884 million Euro) and stayed more or less constant since 1991 (cf. Figure 3) (ARE 2007). In contrast in public transport, there is a clear trend rupture recognizable from 1997 on. Since then, yearly expenditures in public transport doubled. Main reasons for this strong increase are investments in large-scale railway projects.

Theoretical Framework

The theoretical framework of this paper should help us to find a feasible way to determine the strength and relevance of barriers to adoption of more energy efficient transport behaviours. Putting the problems into sets of barriers specific to energy saving behaviours enables a structured way of organizing the problem.

The main framework that we adopt in this paper was developed in a paper “Identification of households’ barriers to energy saving solutions” (Throne-Holst et al. 2007). In their review of the literature, they found and discussed various barriers which other researchers had discussed, such as Shove (1998), Vine et al. (2003) and Crossley (1983). While Shove had too little detail and a top-down view on barriers, Vine et al. had a rather more detailed use of the barrier concept in the field of energy savings in households... [with] 17 potential barriers to end users initiatives. However, Throne-Holst and colleagues determined that the level of detail they used may be too much for the type of material that they would be analysing in their focus groups. Because our information obtained from qualitative stakeholder interviews was similar to the type of information in their focus groups, we have similar needs in the definition of barriers. However, the third author had a great overlap in the level at which we would be looking at barriers; Crossley had energy barriers at the level of individuals and households: (1) personal predisposition; (2) living situation; (3) economic costs; (4) social costs; (5) inadequate information; and (6) barriers arising out of structural factors (Crossley 1983).

Throne-Holst and his colleagues reorganise these six barriers and include the political level as one potential barrier for change since they hold that consumption never takes place within the framework of politics and business (Stø et al., 2004) to make a revised set of six barriers specific to energy saving solutions for households. It is these six barriers which we used to guide our research, and of which we aimed to determine the...
Figure 1: Passenger Performance Capacity in Switzerland from 1970 to 2005 (Source: SFSO, 2007)

Figure 2: Energy consumption in the transport sector from 1990 to 2005 (Source SFSO, 2007)

Figure 3: Public infrastructure expenditures, public and private transport (Source: LITRA, 2008)
strength and relevance of in our stakeholder interviews. The barriers, organized from macro to micro level, are as follows:

1. Physical and structural barriers. Households are a part of society's greater general physical structure. The overwhelming majority is connected to electrical, telecom, water and wastewater networks. The degree and character of freedom of actions for individual households are largely dependent on basic historical traditions.

2. Political barriers. Politicians create frameworks for household behaviour. They give laws, directives and develop regulations on national and European levels. These laws and regulations are set into practice by political authorities. Thus, political authorities are important in the determination of the potential for change, and freedom of actions for households.

3. Cultural-normative barriers. Not all ways of saving energy may comply with the culture you live in. Norway for instance has the world's highest per capita energy use for lighting; a major contributing factor to this is related to the cultural aesthetics, that relates interior lighting and pools of light and shadow to a cozy atmosphere.

4. Economic barriers. Some measures to reduce your household's energy use require investments. These may give a payback over time, but still they presuppose available economic funds in the household to be set aside for such investments.

5. Information barriers. To overcome barriers, individuals need relevant information, or they need information about how to search for such information...

6. Individual-psychological barriers. Finally we all have our own limits to what we are willing to do achieve a goal like saving energy. These habits can have their origin in individual taboos, based on own experiences or upbringing. How information is understood or misunderstood can also be a part of this barrier (Throne-Holst et al. 2007).

These barriers will be identified and discussed in an analysis based on qualitative stakeholder interviews, in order to answer the main question put forth in this article: “What is the strength and relevance of the six barriers for changing households’ energy behaviour?” It is also useful to note here that these barriers are sometimes not exclusive; many barriers will have some aspects of other barriers. However, we will use just one classification for each stated barrier in our results so as to highlight what we see as the most important aspect of a complex situation.

Using these barriers to structure our study not only allows us to organize our results in a systematic way, but it also provides some more depth of knowledge in the understanding of measures to improve energy savings, and can thus help focus our conclusions of how activities from political authorities, transport companies, and NGOs can overcome these barriers.

**Methodology: Qualitative Stakeholder Interviews**

The first task related to the methodology of this paper was the identification of suitable stakeholders to be interviewed, from areas such as political authorities in the form of national and local transport or environment departments, businesses such as car producers and importers, and NGOs within the environmental and consumer fields. Eight Swiss stakeholders were identified in the field of mobility, six men and two women, with whom 30-60 minute face-to-face interviews were conducted (with a few exceptions that were conducted over the phone).

The stakeholders interviewed came from various sectors, and to maintain the anonymity of their answers, we will only refer to their specific backgrounds here, rather than in each specific area in which they were interviewed. On the political level, we interviewed one person from the Department of the Environment, Transport, Energy and Communications (UVEK), one person from the Swiss Federal Office of Transport (Bundesamt für Verkehr), and a high level official from the Green Party of Switzerland.

In the business sector, the two people interviewed were a co-founder of a car-sharing company in Switzerland (Mobility), as well as a high level official of a Association of Automobile Importers in Switzerland (auto-schweiz).

In the area of NGOs, one interviewee was a professor at the Institute for Environmental Decisions at ETH (Swiss Federal Institute of Technology, Zurich), while two other interviewees were from the Transport and Environment Association of Switzerland (VCS).

The methodology of the qualitative stakeholder interviews of this part of the BARENERGY project focused on the following questions related to barriers to change with regards to household mobility:

- What do you view as the main barriers to behavioural change?
- What has been done to overcome these barriers?
- What can we learn from successes and failures in attempts to overcome these barriers in the past?

The first question reflects the importance of obtaining first-hand information from the stakeholders themselves with regards to their opinion on the most important barriers, without first being presented with ideas of various barriers. Following this question, it was then possible to introduce the barriers listed earlier in the project and for the stakeholder to determine their respective relevance and strength. We found it important to do this presentation and the subsequent rating of barriers following the initial question so as not to influence or sway the individual's opinion with ideas he or she may not have thought of before the interview. These interviews also allowed for the possibility of determining knowledge gaps among the stakeholders- information which could be used to inform subsequent parts of the BARENERGY project, namely the quantitative survey of households which follows the qualitative interviews presented here. Interviews were carried out among six participating countries, and it is the results from the national report of Switzerland that are the focus here.

We will also discuss the potential for change in relation to the windows of opportunities. With reference to Kempton et al. (1992) above, it could be easier to achieve one-time changes in behaviour than to alter and maintain repetitive behaviour changes. Targeted information and education could also be more effective than general information tools.
Svane (2002) uses this theory related to environmental questions, in his work about sustainable housing in the Nordic countries. The main idea behind this theory is that in everyday life it is difficult for consumers to change their behaviour and habits, even if people are well informed and motivated to do so. However, when people make certain fundamental changes in their life, they are susceptible to changes on other aspects as well. Potential times when such opportunities arise (or situations or “windows” of opportunities) could be when people change where they live, change their workplace or occupation, get married or divorced, have children, or when their children move out, etc. In regard to transport, replacement of cars opens a large number of opportunities for change.

In addition, situations of opportunities are created by political authorities and businesses. For example, new energy labels are developed, some mandatory and others voluntary, which create situations of opportunities for sustainable changes. Also, new energy efficient appliances, technologies, and more sustainable energy sources may be provided. Political authorities at the European, national, and local levels develop some opportunities and close others by directives and laws, taxation and economic stimuli, changing infrastructures, or providing information. Businesses – both industry and retailers – produce goods and services available on the market, and the price, quality and images of these products are important for consumer choices in the market.

Results
The results have been organized into four sections, each of which is divided into three subsections. The main sections look at the on the focus areas of more frequent use of public transport, decreased use of cars for short distance trips, car-sharing, and lastly, increased purchase of fuel-efficient cars. The subsections of each look at the overview of the barriers in each section, the attempts to overcome the barriers, and the possibilities for future action to overcome the barriers. Within each section, the results are organized according to the six barriers that were discussed in the theoretical framework. We only present the most relevant and important barriers here, i.e. the barriers that multiple stakeholders mentioned and/or deemed to be important. Following the main findings in the results section, we will briefly look at the windows of opportunities mentioned by the interviewed stakeholders.

FOCUS AREA: MORE FREQUENT USE OF PUBLIC TRANSPORT
The area of public transport was discussed with three stakeholders in various sectors of the political sphere. The most important and relevant barriers in this area are listed here.

Overview of Relevant Barriers

Economic Barriers
Many stakeholders shared the idea that oil prices are not high enough to force people to make the switch from driving to using public transportation. Because external costs (e.g. health or environmental costs) are not integrated into fuel costs, people think that driving is cheap. Likewise, public transport seems relatively expensive, only because car use does not include external costs.

Individual Psychological Barriers
People have become comfortable with the habit of driving a car, to its convenience, independence, and privacy. To make the transition to using public transport, it needs to be made very easy for them. Longer travel time, more pre-planning, and decreased flexibility when changing from driving a personal vehicle to using public transport all infer a change in lifestyle that is seen as a big barrier to regular car users. In addition, many people view public transport to be less reliable and punctual than driving their own vehicle.

Structural Barriers
According to the stakeholders, infrastructure for public transport has been historically neglected. While there have been great improvements in recent years with the amount of expenditure on public transport infrastructure, and great gains have been made, during the 50s, 60s, and 70s while there were great expenditures on road transport, public transport was seemingly neglected. Overcrowding during rush hour remains a barrier in more agglomerated areas, and insufficient access to public transport in suburban areas to be connected to the city center. These two barriers make it difficult to compete with the comfort and convenience of a personal car, added to the above barrier that costs do not make public transport a competitive option either.

Information Barrier
Lastly, despite a relatively well developed public transport system, not everyone shares environmental concerns. People are not sufficiently aware of health impacts, space and energy use benefits of public transport.

Attempts to Overcome the Barriers

Switzerland has addressed infrastructure issues in their more recent improvements in funds to finance rail infrastructure, putting it in an enviable position in Europe. What has been learned from these past measures and experiences? ZEB and ZEB II (“Zukünftigen Entwicklung der Bahninfrastruktur” or Swiss Law on Future Developments of Rail Infrastructure) have support from the cantons, but it is still too early to tell how effective these measures are. Bahn2000 also has cantonal support, but there is some resistance from residents because of noise, and some politicians are against it because of the costs. The success of the Federal Modal Shift Law has been questioned by some: transport companies (affected by increased costs) say the initiative has been unsuccessful, NGOs criticize that the Federal Council has not achieved the goal (of no more than 650,000 trucks crossing the alps per year) though there are still attempts to reach the goal, and the Federal Council did not support the initiative from the beginning, but it make attempts to deliver since it was voted on by the people. However, the Heavy Vehicle Fee associated with the Federal Modal Shift Law was applauded by stakeholders as an exemplary part of making the transition from vehicles to trains. Other projects that were mentioned as examples of more projects to improve infrastructure and competitiveness (in addition to measures mentioned in the introduction) were BahnReform (Railway Reform), and “FinÖv” (Fund for the financing of public transportation),
Many of the above projects have improved travel time, and in many cases, while congestion of roads is worsening, train congestion is lessening, making trains faster than driving. The introduction of car-sharing has addressed a need for cars that can be used together with public transport, making public transport even more convenient.

Information Barriers
Stakeholders also thought that efforts directed towards individual consumers have had some impact on public transport usage. Namely, recent public awareness campaigns for climate change have helped make people more aware of how their individual behaviours can help or harm the environment. Swiss Federal Rail (SBB) has also had campaigns to “make yourself comfortable,” with slogans regarding trains being more comfortable than driving.

Possibilities for Future Action

Structural Barriers
Various stakeholders could also be involved in improving public transport infrastructure further. Federal Offices in Switzerland have a role to play here in continuing to support public transport.

Economic Barriers
Increasing oil prices forces those who use infrastructure to pay for it. The stakeholders mentioned were the Swiss Government and OPEC, two entities that have a large influence over oil prices internationally and in Switzerland, respectively. Public transport companies and public transport organizations (Verbände des ÖV) also hold responsibility to reduce the barrier of perceived higher costs of public transport. SBB, for example, could lower their prices. One stakeholder in the industry predicts that ridership would increase with a fare decrease.

Information Barriers
Show the external costs of cars such as pollution, accidents, congestion, etc, to raise awareness of these costs.

FOCUS AREA: DECREASED USE OF CARS FOR SHORT DISTANCE TRIPS LESS THAN 5 KM
The two stakeholders interviewed in about barriers to decreasing use of cars for short distance trips were from politics and a consumer NGO. The main barriers in their vision were Physical and Structural Barriers and Individual Psychological Barriers, as discussed here.

Overview of Relevant Barriers

Structural or Physical Barriers
The overriding problem that was addressed at the institutional level is that planning and infrastructure is focused on motor vehicles. This brings up the major barrier of people not feeling safe walking through towns and cities that have been designed with cars in mind, rather than pedestrians and bikers, or even mixed use. The use of cars for short distance trips is supported by planners by having readily available parking spaces and by efforts to keep traffic moving. Relatedly, motor vehicle traffic generates income in cities where the planning caters to cars.

Individual Psychological Barriers
Similar to the barriers in the realm of public transport, habit is a similarly strong barrier when it comes to not using a car for short distance trips. People have gotten out of the habit of walking, and are no longer accustomed to it as a form of transportation, and do not seem willing yet to accept the inconvenience of longer travel times. And, for regular car users, the social status associated with cars is still important.

Attempts to Overcome the Barriers

Structural Barriers
Cities have started educating people through a change in city planning. By creating more walkable cities, for example, they educate people to walk more. While some cities have adopted more non-motor vehicle friendly planning, it is much needed in many other cities as well.

A new Swiss law that requires limits to parking spaces obliges one parking lot/space to be removed in the city with each new parking lot/space that is created. This has been very effective, despite initial resistance from people who claim their “convenience” is being stolen from them.

Possibilities for Future Action

Structural Barriers
There is a need for planners to create more walkable, safer cities. Thinking must be longer term, and must really integrate using less cars, more public transport, and more walking and biking into the city’s planning. Just one small example of this integration is keeping small shops and post offices in existing villages, so that people are able to get to them quickly and easily by foot or bike. Also very important is traffic safety; streets need to be built so that they are safe for bikers, schoolchildren, and the elderly. Also, another way to improved shared space for example, is to reduce car speeds to allow for sharing the road with bikes in road traffic.

Individual Psychological Barrier
In addressing the Individual Psychological Barrier mentioned above, NGOs could be responsible for informing people different possibilities of how to make changes in their everyday life, both at work and in schools.

FOCUS AREA: CAR-SHARING
A stakeholder from the political sphere as well as two stakeholders from the car-sharing business were contributors to the barriers presented here. While the stakeholders shared the same view on the high importance of access, there was disagreement about the importance of “awareness” as a barrier. The political stakeholder and one of the stakeholders from the car-sharing business thought it was very important, while the other stakeholder in the car-sharing business (from the same car-sharing company) thought awareness was not quite as important.
Overview of Relevant Barriers

Structural Barriers
Car-sharing companies are the institutions that are referred to in this case, as they are the ones responsible for the barrier of difficult access. The service industry of car-sharing has yet to be fully developed to make access easy, to serve people, and to attract people; at present, the system is too complex. Related to this is the lack of penetration in the market, making the service less accessible. In cities one can reach car-sharing locations more easily with public transportation. In the countryside it is often difficult and too much trouble. As with public transport, people are put off by the longer travel time. Car-sharing is not yet as easy or flexible as having a car in the driveway.

Information Barriers
Many people are still unaware of the concept of car-sharing. They may have heard about the car-sharing company, Mobility, but they do not really know what it is all about. This contributes to a related barrier, lack of trust, since people generally do not trust what they do not know. When they are familiar with the concept, there is still sometimes a lack of interest.

Cultural Barriers
People have an idea of a democratic right to access to consumer goods, commuting, etc. Denying people this “right” to their car would be like denying “democracy.”

Individual Psychological Barriers
People have emotions linked to car ownership that is linked to advertising. This can also be linked to the lack of familiarity with the concept mentioned above.

Economic Barriers
The costs of buying and maintaining a car are quickly forgotten. People generally only calculate the cost of the car using gas prices. Thus, the all-inclusive price per kilometer makes car-sharing appear more expensive.

Attempts to Overcome the Barriers

Individual Psychological Barriers
The main attempts to overcome the barriers have been by the car-sharing companies themselves in attempting to improve their business and visibility, and increasing the number of locations where car-sharing cars are available.

Possibilities for Future Action

Structural Barriers
Improving and simplifying access for users to find and use the services will make the services more popular. Service provider companies (i.e. cell phone service providers) are responsible for helping improve accessibility to car sharing (i.e. there is a possibility to reserve and open cars with cell phones). Related to improved accessibility, once the volume of users increases, the services become more user friendly (e.g. higher number of carsharing users allows for more “free-floating” and “multi-port” cars, that may be taken from point A and returned to point B (for multi-port cars) or points C, D, or E (for free-floating cars), rather than just taken from point A and returned to point A. A good example of a new “free-floating” car shar-

Information and Individual Psychological Barriers
Increasing awareness, possibly through an advertising campaign to make the concept more well-known, would likely help the idea become more popular. People need to know that it is worthwhile and that it has financial incentives for them. Developing statistics for parking, traffic, etc. could aid in improving information about the positive impacts car-sharing has. Car-sharing companies such as Mobility in Switzerland have the main role to play in promoting their services. If car-sharing is embraced as a measure to help fix problems on the streets or with the environment, politicians could play a role as well. As soon as the concept is accepted as an official government measure, then politicians must also inform the public. However, in the opinion of the stakeholder in car-sharing, government is nearly irrelevant to the concept of car-sharing, because government moves too slowly to address immediate needs for changing demands.

FOCUS AREA: INCREASED PURCHASE OF ENERGY-EFFICIENT VEHICLES
Three stakeholders from business, a consumer NGO, and politics were interviewed regarding the barriers to purchase of fuel efficient vehicles. The four barriers that they deemed most significant are outlined below.

Political Barriers
First and foremost, there was consensus on the fact that there is insufficient regulatory support from government. The political framework can determine what the current issues are in the automobile industry, whether they be efficiency issues or otherwise. Drastic political measures are non-existent and there is hesitation to introduce effective control measures. Because there is insufficient regulation, there are few clear incentives or pressure for buyers to purchase and drive energy-efficient cars.

Economic Barriers
Another clear barrier is the high profit margin for luxury and larger cars for salespeople, making them more inclined to sell more of those inefficient cars. In Switzerland, with the relative lack of financial hardship, almost everyone can afford to buy a car. And, buying inefficient cars is relatively inexpensive. In addition, the trend of leasing cars makes it possible for people to afford the bigger, luxury cars that they may not have been able to afford if one had to pay the cost up front. According to...
Past Attempts to Overcome the Barriers
Various measures and initiatives to increase purchase of fuel efficient vehicles have been enacted, some with more success than others. In general, the trend that is visible with all of the initiatives mentioned indicated that there is still work to be done to improve the measures, but that much has been learned during the process.

Economic Barriers
The first example, the bonus-malus system, mentioned in the introduction, has had mixed reviews, but generally consumers like receiving discounts, and businesses prefer control measures to outright bans. While the figures presented by the French government proclaim it a great success (ECEEE 2008), it is still early to know the extent to which it will continue to be successful. Some stakeholders noted that the economic downturn may have had some effect on the figures indicating success. Whatever the case, the system may be good for starting a discussion, and for showing people that different types of cars exist. One stakeholder from an NGO was critical of the system, saying it is not focused enough, with even cars that are not really environmentally friendly being “rewarded,” such as those with only “B” ratings on energy labels. This same stakeholder also mentioned another related scheme that is present in some cantons, reduced taxes for efficient cars, however, it has not had a great effect up to now.

Information Barriers
In terms of better information for consumers regarding energy efficiency of cars, two attempts were mentioned. One stakeholder from the political level and one stakeholder from business mentioned that they think energy-efficiency labels on cars with the “Energie Etikette” is a step in the right direction, but that it needs some more work because it only measures carbon dioxide relative to weight, making some heavy cars look comparable to lighter, more efficient cars. This is confusing for customers. Another stakeholder from an NGO said that energy labels in general will not create a true reduction in consumption, and that other measures should be utilized. At another level, information platforms do exist to inform consumers about fuel efficiency and environmental ratings of cars, such as the Auto-Umweltliste which lists the best cars in terms of efficiency and environment, however, it is not used widely enough. Only people already aware of efficiency and environmental issues of cars use this information source. Political Barriers
Recently in Switzerland has also been an initiative to ban SUVs. Though a ban can be the most efficient way to make drastic changes, the problem one stakeholder in business saw is that some see it as an attack on privacy and democratic ideals. However, another political stakeholder directly involved with the initiative sees it as an opportunity to begin a discussion, rather than as a doomed initiative.

Possibilities for Future Actions
Information Barriers
The first area for improvement would be to better inform consumers. From the point of view of both stakeholders from the NGO and business sectors, this could be the biggest impact in overcoming the barriers related to increased purchase of fuel efficient vehicles, as consumers have the final purchasing power. More specifically, the consequences of the purchase and use of a car must be made visible. Because the market can be strongly influenced by advertising, there should be an indicator of how environmentally friendly cars are.

Multiple stakeholders could be involved in an awareness raising campaigns. Auto-schweiz, an organization representing car importers in Switzerland currently offers information on a website showing people how they can be energy efficient in transportation. Likewise, Touring Club Schweiz (TCS), could also play a role in informing consumers. Another key player in this area, the federal government, could play a large role in implementing measures to support improved information for consumers. Lastly, media, in the form of newspapers or otherwise, could also provide a large part of the information platform.

Economic Barriers
Second, the most imperative change in the opinion of stakeholders would be a shift to true pricing, or increasing costs (of fuel, cars, etc...) to reflect all costs of driving (infrastructural, environmental, etc…). This would be one way to address the fact that fuel efficiency is a low priority for new car buyers. Without shifting costs to those responsible for incurring the costs, it will be difficult to achieve behavioural change. A stakeholder from the political sector recommended decreasing the cost of fuel-efficient cars as a way of enticing more people to buy them.

Political Barriers
Lastly, because insufficient government regulation was seen as a highly important barrier to all stakeholders interviewed, new and increased regulations must be implemented to make big change here. One way that was recommended was fuel efficiency regulations at the manufacturer level, and not just in one country because these changes must be larger scale to make a difference. With regard to the bonus-malus system specifically, improvements and clarifications were recommended so that it deals with the purchase of cars based on absolute consumption numbers rather than on relative numbers. If not keeping the bonus-malus system, other stakeholders from the business industry support using similar control measures to influence purchasing behaviour of customers.
Situations or windows of opportunity that were discussed by stakeholders were situations where individual's lives change personally, or were more widespread situations and crises that affect many. The three major changes that affect all people are as follows. Rising Oil Prices have had an effect on increasing people's awareness of the problem. And one political stakeholder predicts that if oil prices continue to rise, driving a car will become too expensive for most people. With the financial crisis and related troubles on the horizon, people may begin to look at changing their transport habits as a way to save money. A GA (General Abonnement) yearly public transport pass is cheaper than a car. Lastly in this area, the Climate Crisis discussion has gotten people thinking about the environment. This discussion has already brought about and can bring about still more changes. If people are interested in environmentally friendly lifestyles, then manufacturers will need to offer more environmentally friendly cars.

On a more personal level, changes in individuals’ lives that could be used as windows of opportunity include the four following examples. As could be expected, stakeholders confirmed that people generally change their car and the type of car they own when they move residences, opening up opportunities to buy more efficient cars. Relatively, new car purchases open another window of opportunity. Before buying a new car, people are generally not interested in information regarding fuel efficiency. But, when they buy a new car, they become more interested in knowing their options. While some studies show that starting a family is when people decide to buy a car, one stakeholder mentioned that in Switzerland specifically, starting a family also opens new opportunities because children in Switzerland generally walk to school, and this is an opportunity for parents to get in the habit of walking again. Also, children find trips on public transport exciting. Lastly, any situations where habits are broken, for example, injuries, losing one's driver’s license, and other situations make old behaviours not possible anymore, opening opportunities for individuals to experience transport differently from their old habits.

Conclusion: Main Drivers for Behavioural Change

From this discussion, we would like to conclude with an overview of the main drivers for behavioural change and link our results to the theoretical framework to determine which barriers offer the most explanation of why people do not change to more energy efficient transport behaviour. We found that all six barriers discussed in the theoretical framework were relevant to the four areas of our study of mobility behaviour, but that some were more important than others. Here we will organize a concise compilation of the most important barriers from these qualitative stakeholder interviews from most important to least important. By important, we refer to a combination of 1) the barriers that were relevant to the most “focus areas” within our study (e.g. if a barrier is relevant to public transport, short distance trips, and car-sharing, it is deemed very important), and 2) barriers that interviewed stakeholders deemed as very important (hierarchically compared with other barriers). With these in mind, we then focus on broad recommendations for possible activities by political authorities, transport companies, and NGOs to help overcome the barriers.

Windows of Opportunity

Rising Oil Prices have had an effect on increasing people's awareness of the problem. And one political stakeholder predicts that if oil prices continue to rise, driving a car will become too expensive for most people. With the financial crisis and related troubles on the horizon, people may begin to look at changing their transport habits as a way to save money. A GA (General Abonnement) yearly public transport pass is cheaper than a car. Lastly in this area, the Climate Crisis discussion has gotten people thinking about the environment. This discussion has already brought about and can bring about still more changes. If people are interested in environmentally friendly lifestyles, then manufacturers will need to offer more environmentally friendly cars.

On a more personal level, changes in individuals’ lives that could be used as windows of opportunity include the four following examples. As could be expected, stakeholders confirmed that people generally change their car and the type of car they own when they move residences, opening up opportunities to buy more efficient cars. Relatively, new car purchases open another window of opportunity. Before buying a new car, people are generally not interested in information regarding fuel efficiency. But, when they buy a new car, they become more interested in knowing their options. While some studies show that starting a family is when people decide to buy a car, one stakeholder mentioned that in Switzerland specifically, starting a family also opens new opportunities because children in Switzerland generally walk to school, and this is an opportunity for parents to get in the habit of walking again. Also, children find trips on public transport exciting. Lastly, any situations where habits are broken, for example, injuries, losing one's driver’s license, and other situations make old behaviours not possible anymore, opening opportunities for individuals to experience transport differently from their old habits.

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Barriers in Order of Importance

Structural barriers were seen to be very important in three out of four areas. Specifically in public transport, stakeholders emphasized that the structural barrier of improving infrastructure must continue to be improved to make it a more competitive option to driving. For car-sharing, the most specific issue that was determined to be very important to remedy soon was access. Car-sharing companies must focus on improving and simplifying access for customers. Stakeholders interviewed about barriers to decreased use of cars for short distance trips highlighted the importance of better city planning. Once cities are designed with pedestrians, bicyclists, and public transport as a priority rather than personal cars, people's behaviours will change accordingly as well.

Economic barriers were the next most important barrier, and were relevant to the area of public transport as well as car-sharing. There is a higher perceived cost of transport for those two modes of transport. According to all of the stakeholders, the cost of driving simply is not high enough to promote people to make the switch since it does not include external costs such as space and environmental costs. In addition, people generally only calculate the cost of the car using gas prices and quickly forget initial investment and maintenance costs.

Individual-Psychological barriers were deemed to be next on the ranking of importance, though the barriers in this realm were relevant to public transport, car-sharing, and short distance trips. Personal habit was one major barrier that was mentioned as very important in all interviews from these three areas. People have become accustomed to the convenience, speed, comfort, independence, privacy, and psychological reliability that car ownership comes with, and are no longer used to walking as a form of transportation. Further, there is a sort of mental justification for people who own cars to use them more rather than less, because they may then feel that they are making the most of the investment. The switch to public transportation entails decreased convenience in the form of less flexibility, increased pre-planning, and in the view of many non-users, increased discomfort. Overall it signifies a change in lifestyle, that of pre-planning your day. That is a major change from not depending on departure times (when using a car).

Information barriers are ranked fourth most important, even though insufficient knowledge or awareness was mentioned in all four focus areas. While almost all stakeholders mentioned it as a barrier, they did not think it was the most important barrier in any one area. However, they did feel that it needed to be addressed in order tackle all aspects of barriers.

Political barriers seemed most specifically relevant to solutions to the barriers related to fuel efficient cars, where there is the need for increased regulation at the national and international level on fuel emission standards and targets for manufacturers. With these two changes at the national or international level, great strides can be made towards more sustainable and energy efficient car transport.

Cultural barriers appear to be the least important in the view of the stakeholders, though they did mention the social construction of transport habits as a barrier. Many people have emotions linked to car ownership that is linked to advertising. There also exists a sort of an idea of a democratic right to access; denying people this “right” to their car would be like denying “democracy.”
POSSIBILITIES FOR FUTURE ACTIONS

The possibilities for future actions came down to three very broad recommendations that will help address most of the barriers that were discussed above, as well as one specific recommendation for the barrier to increased purchase of fuel efficient cars.

Addressing structural barriers is a first level priority in terms of improving infrastructure for public transport, car sharing, and city planning (for short distance trips) as detailed in the results section.

Second, another very important action that is needed to address economic barriers (and also indirectly addressed individual-psychological barriers) is a move toward "true pricing" and various related financial schemes. These were mentioned as possibilities for future actions to move towards more energy efficient transport practices in all four areas discussed. Most stakeholders agreed that increasing oil prices is the most effective way to invest in infrastructure and to have the people using that infrastructure pay for it. The Swiss government can play a role in the determination of oil prices in the country, through taxation schemes for example. In addition, they are responsible for transport infrastructure in Switzerland. The CO₂ tax was also mentioned as a good move toward true pricing. Other schemes, such as congestion pricing and road tolls, mileage or emission based registration fees, VMT (Vehicle Miles Travelled) fees, use-based auto insurance, etc. will set prices that make more efficient car use (such as walking, biking, car sharing, etc...) more financially sensible and desirable. To continue with this example: car-sharing cars could be exempt from any road-pricing scheme or the price per kilometer for low-emission car-sharing vehicles could be subsidized.

Thirdly, there is a need for improving education and public awareness as another possibility to move people towards driving less by addressing informational, cultural, and individual-psychological barriers. Some stakeholders felt that the awareness campaigns are having some effect on people’s ideas of transport, and may have an influence on behaviours as well. To somehow show the costs of cars in terms of pollution, accidents, congestion, etc, would enable people to be more aware of the costs associated to driving. With the example of car-sharing, a concept that is still not well known, creating awareness is of integral importance in making people more comfortable with the idea. Various groups and stakeholders were mentioned as possibilities for improving public awareness.

From one stakeholder’s viewpoint, politicians are responsible for guiding and leading a city, such as in Bern, where the red-green coalition encourages the use of bicycles in the city. In that sense, they have a role to play in image promotion of walking and biking. Also, mayors, for example, have a great opportunity to make change because they are responsible for education in cantonal schools. However, most politicians are not quite as important as planners since they change with each election, and more institutional changes are needed to make a difference. Also, there is an obvious difference of interests between different political parties. Some think that cars are necessary to keep businesses open. But from examples of other car free cities, one can now see that people do walk to shops and that it is not necessary to have cars within the city centre.

Another area where stakeholders have great influence in public awareness is through the media and advertisement. Part of the reason for larger cars becoming such a normal habit could be the media frenzy around them. From one stakeholder’s experience with an initiative to ban SUVs in Switzerland, she was able to see the difference between advertisements from 10 years ago until now. The argument follows that when you always see it on TV, it becomes normal. It seems that both media and advertisers have a responsibility here. Media should be more discretionary in deciding which advertisements to take, and advertisers also have a role in moving towards making more advertisements for energy and fuel efficient vehicles. Related to this image promotion, prominent and famous people could and should advocate for more efficient transport like public transportation and biking.

Also important is increasing public education efforts to inform people of different possibilities and to show them how to make changes in everyday life, both at workplaces and in schools, etc. NGOs currently take on such responsibilities and could be responsible for building upon these efforts. An example of a way to educate children in schools about using cars less would be to take class trips on trains.

Individuals also have a personal responsibility for better understanding the costs and benefits of their transport decisions. Especially in Switzerland’s direct democracy, voters are responsible for voting on laws and big projects such as railway projects.

The last and most specific recommendation is to address the barriers related to fuel efficient cars, where there is the need for increased regulation at the national and international level on fuel emission standards and targets for manufacturers.

Next steps following the study include action on the possible solutions to the barriers, as well as further research to supplement and add to the findings presented here. Because we chose to focus on ground transport within the project, we did not look at the barriers to changes in airplane travel behaviour. However, we realize that this is an area with high potential for making big changes towards more energy savings at the individual household level. As a next step, this could be examined in a further study and would greatly add to the breadth of the findings presented here. Likewise, the findings here can be used to further examine the barriers from the viewpoint of consumers and households. The main hope is that the information and insight gained throughout the process of the interviews will be used to move towards more sustainable transport, and a more energy-efficient future in general.

References


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