

## **WP 4: Stakeholder interviews**

### **National report Switzerland**

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by

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**Content**

- I. Introduction..... 3**
- II. Barriers and Attempts to Overcome Them .....5**
- 1. Area of Domestic Energy Use ..... 5**
  - 1.1. Installation of Photovoltaic Panels (Purchase) ..... 5
  - 1.2. Buying Green Power (Purchase)..... 14
  - 1.3. Energy Efficient Refurbishment..... 18
  - 1.4. Construction of Low Energy Houses..... 24
  - 1.5. Energy Efficient Heating Behavior (Use)..... 28
  - 1.6. Summary of Area of Domestic Energy Use..... 30
- 2. Area of Household Appliances ..... 32**
  - 2.1. Energy Efficient Appliances (Purchase) ..... 32
  - 2.2. Cooking and Baking (Use)..... 37
  - 2.3. Summary of Area of Household Appliances ..... 40
- 3. Area of Mobility..... 41**
  - 3.1. Public Transport (Use)..... 41
  - 3.2. Short Distance Mobility..... 43
  - 3.3. Car-sharing(Use)..... 45
  - 3.4. Hybrids (Purchase) ..... 48
  - 3.5. Fuel Efficient Vehicles (Purchase) ..... 50
  - 3.6. Summary of the Area of Mobility..... 53
- III. Stakeholder Dialogue .....56**
- IV. Conclusion..... 57**
- Annexe .....59**

# I. INTRODUCTION

This report summarizes the results from the qualitative stakeholder interviews conducted in the context of WP4 of the BARENERGY project. In this work package, we asked stakeholders what they perceived to be the barriers for consumers to the adoption of energy efficient behavior and attempts to overcome them.

Interviews were conducted between November and December 2008 in three areas: 17 interviews in the area of domestic energy use, seven interviews in the area of household appliances, and 14 in the area of private mobility. Of those interviews, 37 were carried out in 30 minute to one hour long face-to-face interviews, while two interviews were conducted over the phone. The interviews were recorded and summarized. Some stakeholders provided additional information after the interview.

The interviewed stakeholders include political authorities (national and municipal level), semi-public institutions, appliance industry interest groups, appliance manufacturers, educators, and NGOs. The stakeholders interviewed came from various sectors, and to maintain the anonymity of their answers, we will only refer to their specific backgrounds at the beginning of the different sections, rather than after each interviewee's specific statements. Stakeholders from households were not interviewed in this phase of the project since they will be the target group in the subsequent quantitative survey.

In each of the three energy areas we then decided to focus on several topics. In the domestic energy use area we conducted interviews in regard to power and to heating. The interviews in regard to power were concerned with the barriers to the installation of PV panels and the barriers to the purchase of green power. In the heating section we identified and discussed barriers to energy efficient refurbishment, house construction, and heating behavior.

In the area of household appliances, we conducted interviews in regard to the purchase and the use phase. So we questioned stakeholders about barriers to the purchase of energy efficient appliances such as refrigerators and cooking pans, and about barriers to energy efficient cooking. Cooking behavior was chosen for this study because, besides lighting, this is the area in which the consumer's behavior has the highest influence on energy consumption.<sup>1</sup> The area of lighting is less relevant today since the EU has decided to ban conventional light bulbs, and this subject has also been analyzed in many studies recently.<sup>2</sup>

In the area of mobility, we divided the topic into five subcategories which addressed the issues of use and purchase. Three topics focus on barriers to the 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 two examples chosen were barriers to the purchase of fuel-efficient vehicles and barriers to the purchase of hybrid vehicles.

The interviews started with an open question about the barriers the stakeholder perceives. This aimed at obtaining first-hand information from the stakeholder with regard to their opinion on the most important barriers. The mentioned barriers were then discussed in more detail and also in regard to the responsible stakeholders. Following this question, the interviewee was shown the barriers composed by a literature review. The stakeholder then had to comment on the barriers and to rate their respective relevance and strength. The rating allows for the comparison of the results with the other stakeholders, allows for the creation of graphs illustrating the situation, and also allows for the comparison of the outcomes from different countries, which provides the basis for the graphical elements in the final report. In addition, past measures and actions and ideas for the future to overcome the barriers were discussed. In the last part, stakeholders were asked to think about possible windows of opportunity and how one could take advantage of them. The main idea behind the theory of windows of opportunity is that in everyday life it is difficult for consumers to change behavior and habits, even if

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<sup>1</sup> Bush, E., Josephy, B., & Nipkow, J. (2007). *Energetisches Einsparpotenzial von Fördermassnahmen für energieeffiziente Haushaltgeräte*: Bush Energie GmbH & ARENA.

<sup>2</sup> cf. e.g. Petty, R. E. e. a. (1983). Central and Peripheral Routes to Advertising Effectiveness. The Moderating Role of Involvement. *Journal of Consumer Research*, 10(2), 135-146.

people are well informed and are motivated to do so. However, when people make certain fundamental changes in their life, they are susceptible for changes on other aspects as well.

During the interview process, there were a few findings outside of the results that are interesting to note for ways that the information gathering process could be improved in further research. We found in our initial interviews that the most "important" questions were best left to the end, as people's opinions and thoughts became more solidified and developed during the course of the interview while they thought about the different topics presented to them. Also, it was helpful to conduct the interviews in a semi-structured format; some interviewees were eager to contribute information that sometimes went off topic, while others were more inclined to offer more information and opinions when posed with probing follow-up questions from the established interview template.

In addition to the lessons learned about the interview process, it also became evident throughout the course of the interviews how interrelated the "problems" were between different focus areas. For example, when asked to speak about barriers to decreased use of cars for short distance trips, there were many references to related problems in other areas of mobility such as public transport and car-sharing.

Lastly, with some interviewees, there was a slight discord between the perception of barriers and recommendations of what should be done to overcome them. Sometimes the recommendations dealt with issues that were much broader than dealing with one specific barrier. Therefore it was important that the barriers mentioned were written down in the course of the interview, for that interviewees could be asked for recommendations regarding the specific barriers.

A discord could also be seen when the interviewees spoke of past attempts to overcome the barriers. This could be for two reasons. Sometimes, barriers seen at different stakeholder levels (politics, business, NGOs) are not being taken into account by other stakeholders (i.e. barriers mentioned by NGO stakeholders are not seen or heard at the level of politics or business), and thus are not being addressed. Otherwise, this discord could also signify that past attempts were focused on barriers that have been overcome, and thus no longer exist.

Finally, there was a great deal of overlap between the barriers mentioned by the stakeholders at the three different levels. These overlaps, as well as the differences of opinion, are noted throughout the paper, and can also help inform possible future actions that are necessary both for the stakeholders themselves at all levels, as well as for a possible stakeholder dialogue.

The different area specific barriers can be classified into the six types of barriers household energy saving solutions suggested by Throne-Holst, Strandbakken and Sto (2008)<sup>3</sup>. As mentioned above, the barriers identified are from the consumer perspective.

- **Physical and Structural Barriers:** The physical structure of society can sometimes limit households' desires to change behavior to more sustainable ways. For example, people not having a thermostat in their apartment do not have the possibility to regulate the room temperature.
- **Political Barriers:** The laws and regulations developed by politicians at local, national, and European levels create frameworks for general household behaviors. Political authorities at various levels are also responsible for the implementation of these laws and regulations, and are thus a determining factor in individual households' ability to change behavior.
- **Cultural-Normative Barriers:** Specific cultural norms may inhibit many people from engaging in more energy efficient behaviors. While some actions are considered "uncultured" (like riding bicycles in Hungary, for example), other decisions can be viewed as aesthetically unpleasant; for example PV panels are sometimes considered to somewhat ruin the image of a home, or even the view.
- **Economic Barriers:** Energy efficient behavior can come at a cost, especially when it comes to the purchase of items that are more energy efficient. These high prices keep many people from making the change towards becoming more efficient.

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<sup>3</sup> Throne-Holst, Strandbakken and Sto (2007): Identification of households' barriers to energy saving solutions, Management of Environmental Quality, Vol. 19 No.1, 54-66.

- **Information Barriers:** Many households lack information about energy efficient behaviors or products, or do not know how or where to find the relevant information.
- **Individual-Psychological Barriers:** Individual willingness to make changes can be a very large barrier, especially for changes that would alter individual's personal habits and comfort zones. This is one of the most difficult barriers to overcome.

In what follows, in each sub-chapter of the different energy topics, we discuss the barriers, list the most important stakeholders, give an overview over the past attempts and possible actions for the future, and conclude by presenting some windows of opportunity. In the first part, we first give an overview of the barriers perceived by the stakeholders, classified into the categories mentioned above. Second, we summarize the most important barriers regarding their importance by analyzing the rating data. After the discussion of the barriers and attempts, a Swiss stakeholder dialogue initiative is presented.

## II. BARRIERS AND ATTEMPTS TO OVERCOME THEM

### 1. Area of Domestic Energy Use

#### 1.1. Installation of Photovoltaic Panels (Purchase)

We interviewed 10 stakeholders about barriers to the installation of photovoltaic (PV) panels: five political authorities, two semi-public institutions, two from businesses, and one from an NGO.

##### 1.1.1. Barriers

###### i. Overview of each barrier

###### Economic Barriers

- **Costs**

Compared to normal electricity, solar power is very expensive. The **cost of solar power per kilowatt hour** is a major barrier to the installation of PV panels. In addition, the installation of PV panels involves a **high initial investment**, even when there is a decent feed-in tariff. Most stakeholders see these investment costs as the biggest barrier, especially for private homeowners. Institutional solar power plant operators usually calculate their operational costs, which means that they pay above all attention to the cost of electricity. The initial investment costs are thus less of a problem for them. However one stakeholder from the PV business states that investment costs are less important than total costs for private homeowners too. From his experience they typically do have enough money to cover initial costs.

- **Notional rental value of the building is increased when PV systems are installed**

PV systems are often not included in the insurance of buildings anymore. This usually leads to discussions with the insurance companies and an increase of the notional rental value. This is a smaller barrier but adds to that of the costs.

- **Customs duties and tariffs**

A business representative mention the problem, that importers of PV systems sometimes must pay high tariffs. In addition, parts of a PV system can get held up at customs and that can cost a lot of money and time. In addition, EU vendors do not have to work with tariffs within the EU anymore. When delivering to Switzerland the first time, they often have no idea how to fill out the customs paperwork. Making imports from EU countries like Germany and Austria is thus very difficult, and it ends up being easier to import from Australia or the USA.

###### Political Barriers

- **To low /lack of governmental support and inconsistent political framework**

In January 2009, a feed-in tariff was introduced. The system itself is perceived as good by most of the stakeholders, but it was implemented in Switzerland with a foreseeable flaw. The resources dedicated to the PV feed-in tariff (5% of the earmarked 320 Million Swiss Francs (212 Million Euros<sup>4</sup>)) represent a tiny fraction of existing demand. The cap on available funds for the PV feed-in tariff is set so low, that only very few people can take advantage on it. The capacity allotted for the entire first year was reached after just the first few days inscription for the feed-in tariff was possible. The rest of those interested in the feed-in tariff have been put on a waiting list.

As a result, the discussion of the feed-in tariff has shifted from positive to negative and even the idealists have been scared off. As the cap has been reached, there is basically no interest in building PV systems anymore. Large projects that had already been planned will not be built without feed-in tariff because they lack financial security. Those who planned smaller PV systems are angry, but they often still install the systems.

- **Construction permits**

Construction permits are another barrier often mentioned by the stakeholders of all levels, but generally seen as less important nowadays. Approval procedures are rarely complicated today, except for historically protected buildings. The regulations for getting construction permits differ however from municipality to municipality and the issuance of permits depends heavily on the attitude of the individual in charge of approving them. Sometimes, permits for solar panels are denied despite the fact that they would be barely visible. Additionally, there are municipalities in which the municipal council is not willing to change the building codes. One business representative perceived that the acquisition of permits has become more difficult recently, since there are more requests for them and thus more problems arising from their issuance.

Besides the construction permit issue, appeals from neighbors occur quite often because they may be affected by glare or their view may be encroached upon. Such appeals can be very complicated legally.

#### Individual-Psychological Barriers

- **Lack of trust in PV technology**

Besides the costs, the great amount of risks involved are seen as a major barrier by some stakeholder of all levels, except business. The level of professionalism in the sector is not visible to the public. The lack of trust in the technology leads to a situation where, despite very positive attitudes, only a limited number of systems are installed. However this barrier is consistently losing importance.

The preconception that the production of solar panels uses more energy than the systems produce over their lifespan has also been losing credibility over the past few years. But the statement that the amount of sunshine in Switzerland is not sufficient for solar power production is widespread. However, all except of two stakeholders point out that the limited amount of solar radiation in Switzerland is sufficient for the systems to reach a satisfactory degree of efficiency.<sup>5</sup>

The lack of trust in PV panels not only concerns the technology, but it also involves the installation and the possibility of problems arising after installation. The industry needs to improve in this area - it has to guarantee quality assurance.

This lack of trust, and the fact that PV technology is still being improved, leads to a wait-and-see attitude towards PV by many people.

- **Lack of professionalism on the supply-side (sales and marketing)**

The current offerings on the supply-side are not well structured and are not focused on the customers. There are many firms which started as pioneers in the industry and fought hard against much resistance just to survive. Now these firms (and also installers) often lack strong sales and marketing departments.

- **Competition with other large investments**

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<sup>4</sup> Exchange rate: 1€ = 1.51 CHF

<sup>5</sup> A more real problem is that PV panels do not continually generate electricity (midday vs. evening or winter vs. summer). In the end, the grid, especially the storage capacity of the grid, presents a limitation. Between 20-30% of Swiss energy consumption could be covered if the roofs of existing buildings were outfitted with solar panels [6].

An investment in PV systems must compete with other large investments such as cars or vacations. For many people, altering the source of their electricity is not as important as investing in more tangible goods and services.

#### Cultural-Normative Barriers

- **Architects dislike PV**

Up until now energy has been a marginal issue for architects and the work in this area was always delegated to an engineer in charge of the building's technical and electrical aspects. Questions of energy use and efficiency were never brought up in the design of buildings. Because of this, eight out of ten interviewed stakeholders think that the missing knowledge and especially the lack of will of the architects is an important barrier. Actually, architects need to build roofs that are optimal for PV systems (large south-facing surfaces), but there are only a few architects who view PV systems as important parts of design concepts.

While there is still a large need for change, three stakeholders are convinced that the new generation of architects is different. This new generation is aware of their responsibility and they are concerned about energy efficiency issues.

- **PV systems do not look good (aesthetic reasons)**

There are still many objections to designing things differently in Switzerland, as a result of Switzerland's obsession with aesthetics. In some people's opinion solar panels do not look good on buildings. They are afraid that the PV systems do not fit into the traditional look of the towns, or do not like the panels' colors. In Germany, people are much less sensitive to the aesthetical aspect of the panels.

- **PV as a polarizing issue**

In political and societal discussions PV is often a polarizing issue. In Switzerland one is either "for" or "against" solar power. People that are completely against PV often have a **different vision of what a sustainable energy policy is** and think that nuclear power is sustainable. This **polarization** is perceived as a barrier by stakeholders from the semi-political and NGO level. If energy providers are against PV or say that it is not important, this affects how the public views PV. **Lobbying against** new technology (such as trains or energy saving light bulbs) is frequent. False information or negative images are however very difficult to change.

- **Lack of role models**

If you look around in Switzerland you may see a few PV systems, but they are rare. There are not enough people setting a good example for others to follow and PV panels are thus far from being a standard.

#### Physical and Structural Barriers

- **Small target group**

Three stakeholders from business and NGO level mention the low level of home ownership as a large barrier in Switzerland. About 70% of the population does not own, but rather rents a home or apartment. So there is only a small group of people with their own roof. Because of this small target group for PV, many Swiss solar companies are thinking about focusing on other markets with more potential like Germany. This is despite the fact that the general market conditions in Switzerland are actually quite good. Swiss firms value the strong research on PV that is conducted in Switzerland and also value the competent and reliable domestic suppliers of PV components.

- **Electric utilities**

Electric utilities do not yet know how to deal with the PV systems, and as a result have been making things quite complicated in the point of view of some stakeholders from business and semi-political level. At the moment there are no official recommendations or regulations on how the systems could or should be attached to the grid. There In other countries (such as Spain) solar power is taken much more seriously and valued more by the utilities.

- **Lack of experts**

To build up a market, experts are needed. At the moment, Switzerland lags behind other countries, especially Germany, in regard to the number of PV experts. Interviewees at the business and semi-political level both mentioned the importance of this lack of experts. A stakeholder from the business sector mentioned that the German students interested in an internship in the field of PV always know

much more than the Swiss. There are not enough engineers in the industry (production side) and in the service sector. If there were to be a boom in the sector, there would not be enough installers with the necessary know-how to meet the demand. Renewable energy is not yet an important topic at the technical universities. At the ETH's (Swiss Federal Institute of Technology) architecture institute, for example, they have not been publishing anything that deals with PV.

### Information Barriers

- **Lack of information**

The availability of information is not a big barrier anymore. On the whole there is a lot of information available, and so, if somebody really wants to install a PV system, they can find the information they need. However only interested people consult that information. If it comes to more concrete information, many people do not know **where** they can **get the information**, despite the fact that there are enough organizations dealing with it in Switzerland. The homeowners turn to the architects or installers for help, but they often do not know much.

The technical **solar-specific terminology** is not understood by many people. Among the general public, solar collectors are constantly mixed up with solar cells. Also, people have no idea how much energy they can produce with a certain amount of surface area.

## **ii. Rating and Summary of the Barriers**

Economic barriers are perceived as being the most important by all stakeholders. The high initial investment is perceived as a very important barriers (B2). Also of high importance are the high costs per kWh, which is represented to some degree in the ranked barrier "insufficient governmental support" (B1). The cost barrier could be overcome with an effective PV policy. A feed-in tariff was introduced in Switzerland at the beginning of 2009, but because of the rigid cap, only very few applicants could benefit from it. As a result the feed-in tariff acts currently as a barrier (B1). In this context the political barrier "lack of consistency in the policy framework" (B3) is also perceived as important.

Besides the costs, the great amount of risk involved is also often perceived as an important barrier. Several stakeholders from the political, semi-public, and NGO levels mentioned the lack of trust in solar power (B9) and the preconception that there is not enough sunshine in Switzerland (B11) as barriers. The lack of trust goes together with a lack of knowledge, which is perceived as an important barrier (B5), even though there are a lot of information available. Sometimes however, it might be difficult to identify the right information (B8).

The high costs do not make up the main barrier in all cases. Some people have enough money and could afford solar panels. In these cases it is all a matter of priorities and an investment in PV panels must compete with other large investments such as cars and vacations. A further barrier that was mentioned by multiple stakeholders from business and politics is the lack of professionalism on the supply-side (sales and marketing). Solar companies in Switzerland often lack strong sales and marketing departments.

Cultural-normative barriers matter as well. The architects' lack of interest in PV and their dislike of PV was mentioned as an important barrier by some stakeholders from all sectors (B4). Another barrier of medium importance in this category is the aesthetic aspect of solar panels (B7).

As far as the structural barriers are concerned, the small target group for PV is highly significant, since 70% of the Swiss population rents and does not own their own homes or apartments.

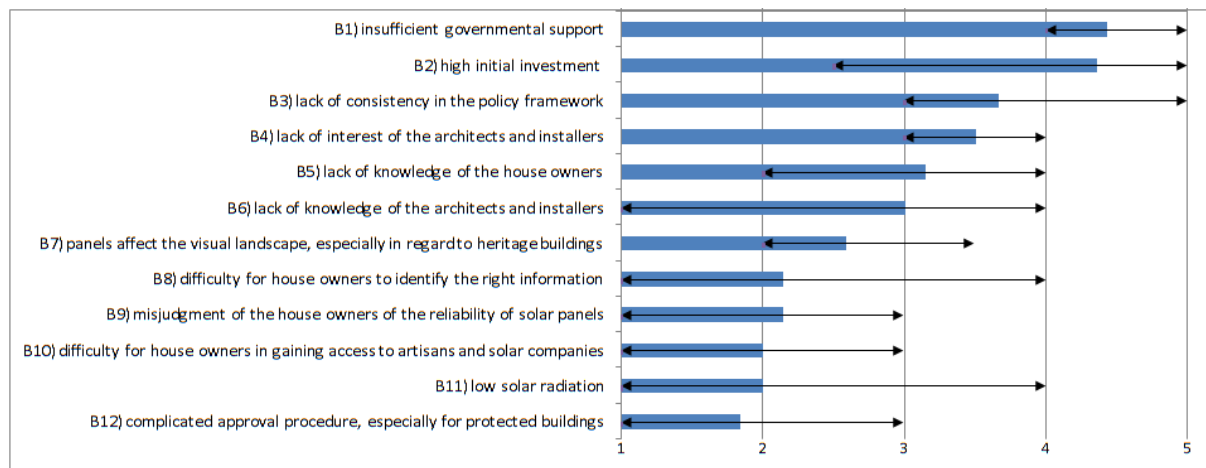


Fig. 1: . Range of respondents' ratings of barriers to the construction of PV panels (from 0=no perceived barrier to 5=very important barrier).

### 1.1.2. Relevant Stakeholders

- **Policy makers:** They are important especially in regard to the feed-in tariff.
- **Banks:** It is important that banks offer loans with favorable conditions for PV investments (cf. Germany).
- **Architects:** Architects are important stakeholders when there is a new building being built or when roofs are being renovated..
- **Public authorities (municipalities, cantons, etc.):** They must set an example with solar panels on public buildings and complicated approval procedures should be avoided<sup>6</sup>.
- **Industry groups (especially Swissolar):** They could create training programs that are in line with the market.
- **Universities and schools**

### 1.1.3. Past Attempts to Overcome the Barriers

#### Overcoming Economic and Political Barriers

- **Feed-in tariff** (See also political barriers above)

The feed-in tariff started at 0.49 €/kWh (0.75 CHF<sup>7</sup>/kWh) in 2009 and is reduced every year by 4%. Fixing a cap on the feed-in tariff is seen as a clear political failure by nine out of ten stakeholders. The cap is set much too low. There should be no limit as there is a large demand for PV systems. Stakeholders suggest that instead of planning new nuclear power plants, Switzerland should invest more into PV. However, two stakeholders also mention that, at the time of the difficult political process, a better deal could not have been reached. Some stakeholders think that the cap can have a counterproductive effect on the population's opinion of PV.

Furthermore, the regulations are very complicated and thus only specialists who work with them on daily basis really understand them, but even they have differing opinions when it comes to the details. One representative from business mentioned that people on the waiting list should start with PV construction. This will bring a higher feed-in tariff later, since the amount of the feed-in tariff is set based on the date the PV system is built. Other interviewees were unfamiliar with this approach..

- **Subsidies**

<sup>6</sup> In the areas zoned for construction, the municipalities are the ones who issue permits. In areas that are not zoned for construction or for property protected by law, the cantons make the decisions regarding permits.

<sup>7</sup> Exchange rate: 1€ = 1.51 CHF

In the past there were attempts to create incentives using subsidies. Yet the subsidies were neither continuous nor comprehensive and only offered by a few cantons and municipalities. People hardly used this support because they did not know about it and also because the investment is still too high despite the support. Subsidies have been much more successful for solar collectors.

- **Tax deductions**

Tax deductions are very interesting, especially for the homeowners who are better-off. This group is relatively small, but important as it is currently the main target group in regard to the diffusion of PV. Because of the feed-in tariff, the tax deductions will probably be discontinued soon.

- **Long term contracts**

Some electric utilities have signed long term contracts with solar power producers that guarantee that the solar power that is produced is compensated. These contracts help to create a sense of security for the owners of PV systems.

#### Overcoming Information and Individual-Psychological Barriers

- **Awareness raising and spreading accurate information**

The increased awareness of climate change and the limited supply of fossil fuels, the media's new interest in PV, and also the stock market boom that a range of solar companies experienced have all contributed to getting the attention of a broad portion of the public.

Swissolar is an example of an industry association that, besides taking care of its members, also informs the public, especially homeowners, through a variety of different channels (publications, websites, events, and industry fairs and conventions). However, Swissolar is not built in a way (not financially, nor with enough personnel) to mount large informational campaigns often.

Other important platforms for spreading information about PV include the "European Solar Days" and construction industry fairs. Public "Energy Apéros" draw large crowds, but many participants are already interested in energy and know a lot about the topic.

#### Overcoming Physical and Structural Barriers

- **Training of architects and installers**

In the past, there have been a couple of education initiatives which seem to have fallen on deaf ears. About 15 years ago there was a further education program for architects and installers created together with the Swiss Federal Office for Economic Affairs. While the systematic approach of the program had a lot of potential, it could not be implemented because there was no market for it. Several years ago Swissolar organized a national photovoltaic conference together with the architecture department from the ETH Zurich, yet only half a dozen architects participated.

Recently, there have been more successful initiatives in the area of education, especially regarding installers' education. As a result, most installers know the basics of PV, and also a new generation of architects more aware of energy issues is slowly forming. Within Swissolar, there is a professional group that wishes to support further education. "Penta Project" courses for solar heat and solar power primarily address installers. There is also a group (supported by the Swiss Federal Office for Energy) that works on technical questions regarding the integration of PV into buildings and that information was distributed by the Façade Builder Association. Further, since 1991, there is the Solar Prize, that also considers the aesthetics of buildings, which architects value a lot.

### 1.1.4. Possibilities for Future Action

#### Overcoming Economic Barriers

- **Removal of the feed-in tariff cap**

Once the feed-in tariff cap is gone and more funding is available, the interest in PV will automatically increase.

However, two stakeholders thought that currently there should not be any additional governmental support in the area of PV systems, because this will only make the less innovative sector of silicon cell technology stronger. They believe that one should wait until there is a clear decrease in costs.

- **Remedies to high initial costs**

Dividing up the investments into multiple installments over time would be an attractive alternative because then all the money would not need to be available at the beginning.

Also the banks should offer attractive loans to contracting companies and private investors. PV systems are low risk investments since they are very reliable and have a minimum lifespan of over 20 years.

- **Long-term price reduction: Governmental support for research and the industry**

There are two significant factors which could lead to a price reduction: Larger volume (economies of scale) and technological advancement through basic research.

Some pro-research stakeholders (especially from the political and NGO level) in favor of the second strategy think that currently investments to medium to long term measure should be made so that Switzerland can keep up in the future.

Other stakeholders, especially from the solar industry, but also from political and semi-political level, think that the focus should now be on building up a market as there is already being done a lot of research. The development of the technology in research labs needs practical experience and the prices will only drop if there is an increase in volume. As a result, there must be support for the industry, even if this means that large firms will be cross-subsidized.

- **Industry focus on solar accessories and new technologies**

Stakeholders suggest that Switzerland should concentrate on solar accessories (inverters and special saws) and new technologies (like thin film). Integration of PV systems into buildings will become an important part of the industry (e.g. solar roof shingles, special building shell combinations, easy to use mounting brackets/systems, etc). To promote building integrated systems, the importance of aesthetics in Switzerland could be useful as they would be willing to pay the higher price for the more aesthetically pleasing integrated systems.

- **Central laboratory for measurements**

In Switzerland there is no good laboratory to test solar panels' effectiveness quickly and inexpensively. A laboratory would have to be able to measure the degree of effectiveness of a system within a week, because people want to know if their systems are cost-effective. The measurements that are done today are not very professional (partly done by technical colleges) and they take too much time. Due to capacity overloads part of the testing has been outsourced to Italy, but there have been problems with projects being delivered on time with many Italian businesses.

### Overcoming Political Barriers

Measures to promote PV could be implemented all along the value chain, from new technologies to introduction in the market (i.e. basic research, applied research, transfer of technology, testing new technology, bringing technology onto the market). The further along the value chain one goes, the further one gets from the term "technology." Customers do not want technology, but rather a well functioning solution. The fact that not all people are interested in PV and are more interested in the electricity they get from it is still not considered enough.

### **Supportive measures to bring technology to the market**

Supportive governmental measures are like branding, they influence people psychologically.

Supportive measures to bring technology to the market achieve two things. First, consumers see them as a way for them to pay less. Second, looking at it from the view of the economy as whole, political measures need to be developed that allow for industry development and use economies of scale to bring down prices. In general, continuity and reliability are fundamental when dealing with instruments to stimulate an industry.

- **Feed-in tariff**

The feed-in tariff, as it has been implemented in Germany where there is no cap but tariffs are gradually decreased, has proven to be the best way to support the PV market. Feed-in tariffs are efficient because they are production-oriented and financed by the power consumers rather than public funds. A production-oriented measure is important to promote installations of high quality. The feed-in tariff is thus very successful in Europe, but the transfer to the free market should not be overlooked. The question here is: How will the transition to a situation where PV systems are economically appealing (without governmental support) occur and will it happen soon enough? Whereas European markets

only function because of feed-in tariffs, in the U.S. there is no governmental support in that sense, just occasional tax relief and individual subsidies. Therefore, in the U.S., the first "natural markets" are being created. There are energy utilities that are investing in PV.

- **Subsidies**

Subsidies motivate consumers, but they are not enough to make PV system installation cost-effective. Another drawback of subsidies is that they must be approved every year by the parliament. During difficult economic times, PV subsidies are likely the first to be cut.

- **Tax relief**

Americans respond well to tax deductions. Stakeholders had differing opinions on the effectiveness of tax relief. They may be enticing for homeowners that are more well off, but are not well known in general. Because of the recently introduced feed-in tariff they may disappear in the near future.

#### Overcoming Cultural-Normative Barriers

- **Designing less noticeable PV systems**

A challenge for the industry is to meet the aesthetic concerns of homeowners and especially architects who have been reluctant to use PV systems. There must be a broader array of products offered. Colors and forms need to be made to be better integrated into roofs.

- **Building component industry**

Businesses should work together to produce building components so that people do not think about solar panels separately but that it is integrated in the entire home design. Efforts to better integrate PV systems into homes are necessary to improve the aesthetics of PV. Balcony and window manufacturers have already come up with ideas for multifunctional products.

- **Waiver for PV construction permits**

The waiver of construction permits achieves two goals. First it shows that the state supports PV, and secondly, it solves the issue of many people being uncomfortable visiting authorities and avoiding it.

#### Overcoming Information and Individual-Psychological Barriers

- **Awareness raising and spreading accurate information**

The creation of a market for PV requires better communication (especially awareness campaigns). Regular and targeted information campaigns are necessary. The Swiss Homeowner's Association, for example, could reserve a two-page spread for this topic in their biannual magazine. The articles should be complemented with photos because images help people get a better understanding of PV. Another possibility could also be broad campaigns like the WWF's climate change campaign, however it would be necessary to obtain financial resources for such a campaign.

It is important that the information reaches the general public and not just "insiders". To get the information to the masses, local organizations, municipalities, and cantonal energy consulting services should steer people towards this information. Because many people in Switzerland trust the authorities, they could have a big impact. Increasing awareness and spreading accurate information is important to break down preconceived notions like the idea that there is too little solar radiation in Switzerland.

Finally, a stakeholder remarked that the current arguments for PV are not strong enough: PV does not deliver enough kilowatt hours and at a price that is relatively high. It should however be emphasized that PV is a key technology and that no other technology has the potential to produce as much power as solar.

- **Marketing**

For future marketing efforts it would be very interesting and useful to identify possible target groups. In Switzerland in particular, people want independence. By installing solar panels people can distance themselves from the conventional electricity grid. One could argue that by using PV systems they are independent of changes in electricity prices and also do not need nuclear power.

Image-based campaigns are needed to show people that PV is cool. A federal councilor, for example could motivate people by recognizing owners of PV systems with an official document or plaque (like with MINERGIE-P homes), host a reception for owners of PV systems, by creating of a special honorary club for the owners, or by simply mentioning those who have a PV system, etc. Prominent public figures (opinion makers) who have a lot of influence on public opinion in Switzerland could also help

improve the image of solar energy. In Hollywood, stars have huge PV systems and this should be taken advantage of by solar PR people. However, in addition to the rich and famous people's properties, small homes with PV systems should also be shown to not give the impression that only rich people can afford solar.

- **Improvement of market structures**

The offerings of PV companies are not professional enough in that they have no sales and marketing activities. PV businesses selling solar panels should advertise on television, in newspapers, and on posters or billboards (cf. Japan). Also, there are too few players in the solar market and thus no competition exists. In Germany, this is less of a problem, as there are more players creating more competition. As a result, if a company is not well positioned, it disappears from the market.

- **Risk compensation for installers and architects**

Since installers and architects have little experience in PV system installation and PV orders entail risk, many would rather limit themselves to their core competencies. Offering some sort of compensation for every system they sell, for example 1000 CHF per system, would be an incentive to take PV orders and the risk involved.

### Overcoming Physical and Structural Barriers

- **Further education and training for architects and installers**

In vocational training it is essential that renewable energy is included systematically in the curriculum. During the basic education of architects, the technical systems, electrical systems, and energy use of homes should be covered in more detail. Regarding further education, systematic programs need to be made, not just select courses and trainings about the planning and installation of solar equipment. These should be made brief and practical since professionals generally cannot participate in training programs that take months to complete.

Famous architects could be role models if they begin using PV in their designs and they could have a great impact on education.

- **Creation of a new profession "solateur"**

If the volume of PV systems desired increases quickly in the near future, then there will not be enough trained experts to advise, sell, and install all of them. As a result, it would be necessary to decide between training specialized solateurs who would only work with solar, or giving all installers basic training in solar panel installation. The discussion about the necessity and advantages of this new profession is on-going. While PV associations (composed of engineers or consultants who have never been on a roof) do not support it, the creation of this profession makes sense for solar panel installers. A benefit of having professional solateurs would be that all systems would be installed professionally and at a lower cost. However, it may be problematic that solateurs would not be the first point of contact for customers. Conventional installers would likely not direct customers to solateurs because doing so would mean losing an order.

- **City planning**

City planning could promote PV in several ways. Zoning codes could mandate that in all new developments the roof ridge should run from East to West to make them ideal for solar panels. Regulations for planting trees (where trees block the sunshine that solar panels need) could be a further possibility. Another idea could be solar communities, where permission is given to deviate slightly from building codes (allowed to build a home that is higher or has more square footage) if you install a PV system.

- **Legally require the use of solar or green power**

The law could state that all new homes must include a certain amount of renewable energy. Before introducing an obligation for all new houses, one could also change the MINERGIE standard in the sense that a labeled house has to produce a certain amount of power (e.g. 5%) by itself. A green power obligation could also be introduced for existing households, i.e. they need to cover a certain percentage of their total energy consumption with renewable energy sources either by producing their own energy (e.g. solar power) or by purchasing green power. However this measure would spark lots of debate because everyone is personally affected by it.

Instead of a legal requirement for households, there could be one for electric utilities. As a result a certain percentage of the power they sell would need to be solar power.

### 1.1.5. Windows of Opportunity

- **Construction, purchase, or refurbishment of a house**

Building, buying, and refurbishment of homes are all good opportunities to inform owners of the benefits of PV. It is important that PV is taken into consideration right from the start of the planning process so that no expensive changes are necessary once construction has begun. However, new homeowners often have debt and insufficient funds for a PV system.

- **A promising target group**

Many married couples between 50-60 years old have owned their homes for 20-30 years, the kids have moved out, and they make good money. Their mortgages are usually more or less paid off and they have cash on hand (pensions). Sometimes they want to do something for the environment and since they can also save some money on taxes in the process, the installation of PV panels is very attractive to them. This promising group can be reached at trade conventions, by offering courses, through publications, and also with normal advertisements.

- **Nuclear power plant debate**

People on one side of the nuclear debate may see installing a PV system as a way to produce their own electricity and help prevent the construction of a new nuclear power plant.

- **PV panels in combination with private mobility**

PV systems could be used in conjunction with private mobility. Over the past 2-3 years the "plug-in" cars arriving on the market have become a hot topic.

## 1.2. Buying Green Power (Purchase)

Six stakeholder from the political (four), NGO (one) and business (one) have been interviewed regarding green power.

### 1.2.1. Barriers

#### i. Overview of each Barrier

##### Individual-Psychological Barriers

- **Lack of will**

A very important barrier perceived by stakeholders from business and NGO is the necessity to sign up for green power. This is an additional step that consumers need to take. To switch to green power is perceived as being complicated and time consuming.

- **Lack of trust**

see information barriers

##### Physical and Structural Barriers

- **Structure of electricity purchase**

Electricity simply comes out of the outlet, with no need to register with the supplier first. Electricity is also abstract, you do not see or hear it. As a result, people do not deal with electricity as a product and have thus few requirements for it. Usually they use the kind of electricity that is offered to them as the default. As most electricity providers don't offer green power as their standard default, consumers would have to take an additional step by signing up for green power.

- **Green power is not available everywhere**

In many locations, especially in rural areas, it is not possible to purchase green power (i.e. for about 50% of Switzerland). Of approximately 900 Swiss electric utilities, only about 400 offer green power products, and these are usually the larger utilities.

- **Lack of standardized regulations**

In Switzerland there are many different labels. There is however a need for standardized regulations for green power, otherwise consumers are confused and there will be a lack of credibility about labels.

### Economic Barriers

- **Green power is too expensive**

Often the price is mentioned to be the main barriers. Many stakeholder however perceived it as a barrier for a small group only. The suppliers do not only offer the expensive solar-only products, but also green power which has a price that is not much higher than that of conventional power. Past surveys have shown that about 30-40% of people would be willing to pay 20-30% more for green power. The question is then if they really do it. Even if green power had the same price as conventional power there would still be the problem of getting people to switch.

- **Electricity is too cheap**

People do not think about their electricity bill too much due to low electricity prices. The choice of electricity type is thus not a conscious choice.

### Information Barriers

- **Lack of knowledge**

Because electricity is simply provided to consumers, many do not know what sources their electricity comes from. This situation has improved since the federal government required that electric utilities declare the origin and method of production of electricity starting in 2006. However, many people barely have a look at the declaration.

There are still consumers that do not know about the possibility to purchase green power. Also for many consumers it is still not clear how the concept of green power works. This last point is not viewed by all the stakeholders as a prerequisite to enhance the purchase of green power. Some believe that it is more important that consumers simply know what the result of their green power purchase is.

- **Added value is not known enough resulting in a lack of trust**

The added value of green power (power plants, certification process, etc) is often not communicated enough and people thus do not understand what the result of their green power purchase would be. So, for example, electric utilities selling hydropower as green power need to communicate the quality of green hydropower in contrast to conventional hydropower. They need to show that with green hydropower there is better use of the residual water, fish ladders, etc. Without this information, consumers might not see the difference between green hydropower and conventional hydropower from pump-storage hydro plants and they will not understand why they should pay more for the green hydropower when a large portion of the Swiss production mix already consists of hydropower.

The lack of trust following from this unclarity was mentioned as an important barrier by many interviewees. It is therefore unclear whether green power is simply a marketing strategy for the electric utilities or if it really intend to improve the environment.

### Political Barriers

- **Feed-in tariff and selling green power are not compatible**

Some stakeholders believe that the utilities' strategy of selling green power clashes with the feed-in tariff. It is inefficient to have two strategies at the same time. Because the feed-in tariff requires that all Swiss citizens contribute to funding renewable energy, green power has become a tough sell. Green power customers must pay the premium green power price in addition to funding the feed-in tariff.

### Cultural-Normative Barriers

- **Family structure**

The one who receives the electricity bill usually also pays it. If the choice of electricity were to be discussed with the other members of the family, there may be different choices being made.

## **ii. Rating and Summary of the Barriers**

Individual-psychological and physical-structural barriers are perceived as the most important by the stakeholders. Because power is not visible (B1), many consumers do not think of electricity as a prod-

uct, i.e. not make the choice consciously. Also many consumers lack of trust regarding the power company's declaration (B3). As a result, people usually perceive the additional step to switch to green power is complicated and time consuming. Consequential, effective marketing strategies are necessary to convince consumers, however many interviewees think that these are not very effective and need to be improved (B2).

Information barriers are perceived as being of medium importance. There are still quite a few consumers who do not know that it is possible to buy green power (B4) and consumers do not always understand the concept of green power marketing (B6).

Views on the importance of the economic barrier, i.e. the higher power price (B5) are divided. Two stakeholders (from politics and business) see it as very important, whereas the other interviewees perceive it as of little importance because the extra costs associated with green power are minimal.

Another physical-structural barrier, namely "the lack of the option to purchase green power" (when it is not offered by the utility) (B7) is, on average, perceived as less important. However, stakeholder perceptions in this area vary from very important (business) to not important (semi-political, NGO).

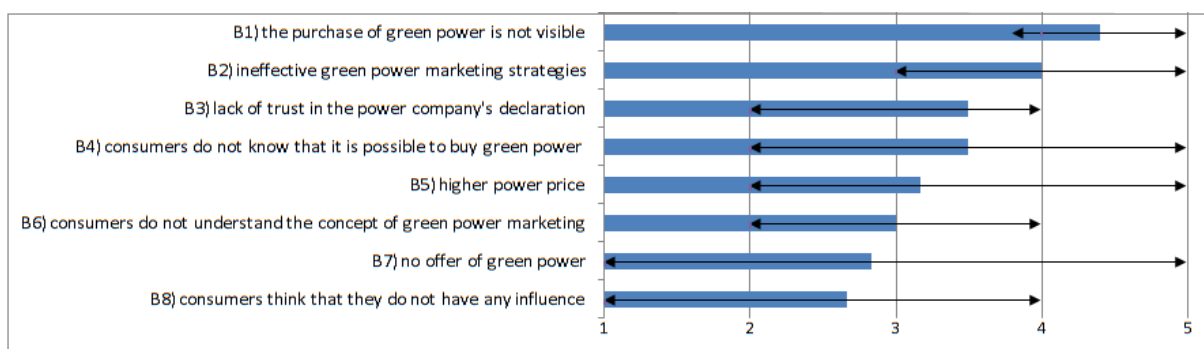


Fig. 2: Range of respondents' ratings of barriers to buying green power (from 0=no perceived barrier to 5=very important barrier)

### 1.2.2. Relevant Stakeholders

- **Electric utilities** are the most important stakeholders. As electricity producers and suppliers they have the ability to directly implement measures such as offering a default product partly consisting of green power, or conduct marketing campaigns.
- **Companies and municipalities:** there are only a few decision makers that need to be convinced to change in order to have a big impact.
- **Associations in the area of renewable energy** could become more active and communicate with the public in unison. They should work on convincing the energy suppliers to switch to green power and could launch a large publicity campaign at the same time.

### 1.2.3. Past Attempts to Overcome the Barriers

#### Overcoming Individual-Psychological Barriers

- **Marketing und Communication**

Several electric utilities have planned and implemented successful marketing strategies. The most-used medium is the informational flyer. Since consumers look up to utilities, several interviewees think that consumers read the flyers. However this measure alone is not enough. Another marketing measure applied is the sponsoring of big events such as the 2008 European Football (Soccer) Championship in Switzerland.

- **Default power mix** (see below)

#### Overcoming Physical and Structural Barriers

- **Green default power mix**

A very successful measure to increase the amount of sold green power is for electric utilities to offer a default product with a power mix that includes green power. If a customer does not want the green default product, he would have to switch.

#### Overcoming Information Barriers

- **Electricity declaration**

Since 2006 there is a regulation in Switzerland that mandates that the yearly electricity bill sent to consumers include a declaration of the origin (electricity source and whether it is produced domestically or abroad) of the electricity. The transparency that this created was an important first step, but not enough to inform the masses since many do not even look at the declaration. As a consequence, the declaration requirement did not have the desired effect of provoking discussions.

- **Naturemade**

The product identification for green power is not patented. The naturemade labeling system was introduced to ensure ecological effectiveness and ensure transparency about the offer of green power. It sets quality criteria, and thus contributes to the clarity and credibility of green power, and it assures the creation of an additional ecological value through the building up of green energy capacities.

### 1.2.4. Possibilities for Future Actions

#### Overcoming Physical and Structural Barriers

- **Energy suppliers must make it possible to choose energy products**

All electric utilities must offer consumers several different energy products to choose from. People can be pushed to make the right choice. Utilities must also explain things clearly on their websites, which is not done very well at the moment.

- **Collaboration with companies and municipalities**

Collaboration with municipalities and companies makes sense as there are only a few decision makers to convince.

#### Overcoming Economic Barriers

- **Communicating added value**

The added value of green power needs to be communicated more. Besides a clear labeling system, opportunities for the added value communication are open houses at green power plants, excursions, informative articles in consumer magazines, descriptions of the certification process, etc. Good communication of the added value also includes a truthful calculation of all the costs of the power.

#### Overcoming Individual-Psychological Barriers

- **Marketing**

Marketing approaches should be more target group oriented and present green power as cool and fashionable. Identification of promising target groups could help the electric utilities' marketing efforts. Potential green power customers are not necessarily rich; it is the educated middle class which is aware of environmental issues and which can afford green power. Possible marketing measures to make green power more fashionable include image campaigns with famous people like Roger Federer or the sponsoring of special events as open-air concert festivals.

It is important to get the concept of green power as close to the customer as possible. Green power should be made visible somehow. One idea is to give green power customers green electrical outlet covers or at least stickers for light switches.

One marketing technique that is rarely used is energy providers calling customers directly to inform them about green power and ask about their preferences. However, several stakeholders thought that consumers would feel pressured by phone calls since the Swiss dislike telemarketing. Others, however, think this approach may be very successful, especially if the calls come from the energy suppliers, as people then will not see them as the typically annoying telemarketers.

Another approach that could be expanded is combination offers: With the purchase of a refrigerator the customer would also get a certain amount of green power or with the purchase of a bicycle the customer could get one year of green power for free.

- **Position of Public Authorities**

To set a good example, all public buildings (of the federal administration and cantons) could use green power. Especially cities with the “energy city” label should consistently expand their use of green power to serve as an example for others.

Further, the trust in green power would improve if the Federal Council were to clearly support green power.

### 1.2.5. Windows of Opportunity

- **Moving**

When people move and register in a new town they should be made aware of the green power offerings from the local energy provider.

- **Electricity market deregulation**

Once the electricity market has been deregulated, then consumers will be able to choose the energy provider what allows them to choose one that offers them the power mix they prefer.

- **Annual declaration of origin of electricity by utilities**

The yearly electricity declaration should point out green power offerings, so that consumers better understand the mix.

- **Children**

Families with children often think more about sustainability than single people. Surveys also show that people with children tend to oppose nuclear power.

- **The moment people realize that electricity is being produced from unsustainable sources (coal power plants, gas power plants)**

Some utilities have recently decided to invest in coal power plants. Such decisions should be publicized and at the same time consumers should be offered green power for purchase.

- **New nuclear power plants**

In approximately 5 years there will be a vote regarding new nuclear power plants. Consumers can show their opposition to nuclear power plants by buying green power.

- **European and international energy policy**

If prices rise there will be calls for independence from foreign sources of electricity. One should take advantage of such events to ensure that energy is produced locally or regionally.

## 1.3. Energy Efficient Refurbishment

Barriers to energy efficient refurbishment and attempts to overcome them were discussed with five stakeholders. Three stakeholders from the business level (energy sector, construction, and building industry), one stakeholder from academia, and one from a bank were consulted. Interviewees’ points of view differ very little in this chapter as well as in the two following chapters.

### 1.3.1. Barriers

#### i. Overview of each Barrier

##### Physical and Structural Barriers

- **Lack of knowledge of professionals**

The lack of knowledge about energy efficient refurbishment of those responsible for the logistics of refurbishment (architects, contractors, artisans) is a highly relevant barrier. Most of the architects, contractors, and artisans that people turn to for their home refurbishment do not know enough about

refurbishment for the purpose of energy efficiency. They do ignore the specific products or how they fit into the overall energy efficiency of the house. As a result, often only partial refurbishment is undertaken, for example the replacement of windows or painting the façade without improving insulation.

- **Renters have little influence**

Renters hardly ever have the opportunity to have an influence on the energy efficiency of their home.

#### Economic Barriers

- **High Investment costs of refurbishment**

Energy efficiency related building refurbishment costs can add up quickly. As a result, private property owners generally prefer doing partial rather than comprehensive refurbishment which spreads the investment costs over several years. However, partial refurbishment is much less efficient in regard to energy efficiency.

- **Planning-related costs**

Doing incremental or partial refurbishment, homeowners can save money on planning costs - in addition to tax deductions savings (see above). This is because the artisan that does the work can plan the partial refurbishment without creating extra costs for the homeowner, and thus no separate planner is needed when only refurbishing a specific element of the building.

- **Notional rental value**

Investments in energy efficiency increase the notional rental value of a property, so that the owner who occupies the property may have to pay more taxes after the energy-efficiency related refurbishment than before (in Switzerland the notional rental value is considered taxable income).

#### Information Barriers

- **Lack of knowledge of homeowners**

The lack of knowledge about energy efficient refurbishment is an important barrier. Homeowners rarely know how much home refurbishment costs, nor do they always know what benefits it has.

- **Difficulty identifying competent artisans**

There are many different suppliers so it is difficult for homeowners to find the competent artisans.

#### Cultural-Normative Barriers

- **In general there is little refurbishment done in Switzerland**

Since a couple of years ago, more and more houses are reaching a time where refurbishment is necessary. The subject of refurbishment has been pushed aside for quite a while.

The low refurbishment rate is also linked to the high portion of population that rents (approximately 70%). Landlords do not have to pay for heating but would need to make the initial investment in case of a refurbishment.

- **Problems of understanding between architects and engineers**

These two groups sometimes do not understand each other. The architect is clearly the most influential actor in the whole process. He has great influence over the property owner and makes most of the decisions. Architects are generalists and they choose the specialists who will support them, and they thus coordinate the activities of the specialists. Traditionally architects always needed structural engineers, but today they need an energy engineer, heating engineer, ventilation engineer, building services engineer, etc. For large projects hiring engineers for all the different areas works to a certain extent, but it is more difficult in the context of family homes. As a result, architects often turn directly to the heating or sanitation companies who are interested in sales and not planning.

- **Lack of interest from architects**

In the point of view of stakeholders from the construction sector and from politics the main priority of many architects is often to make a name for themselves instead of being a normal provider of services. That is why they often prevent energy efficient construction. Several stakeholders viewed architects more like artists and lone fighters with little knowledge or interest in energy efficient construction. A couple of interviewees are however were confident about the future as they perceive an increasing interest among the new generation of architects.

- **Slowness of joint ownership decision-making processes**

Condominium apartment buildings (in which each floor of the building has a different owner) have been widespread in Switzerland since the 1970s. Now these buildings are slowly entering the phase where refurbishment is necessary. The problem with condominium apartment buildings is that to change something on the building, all the various property owners need to agree. So one person can easily block refurbishment.

#### Political Barriers

- **Cantonal competencies in the construction sector**

The regulations differ from canton to canton (taxes, financial support, building laws) and this makes most things more complicated. Sometimes there are even cases where cities and towns interpret regulations in different ways.

- **Tax laws favor partial or incremental refurbishment**

Partial refurbishment is preferred due to taxation laws which allow for value-preserving refurbishment to be deducted from taxes. This leads to a situation where property owners will only make isolated changes each year, like replacing the windows or painting the exterior. From the perspective of energy efficiency, doing everything at once would make more sense.

- **Building laws**

Slow and cumbersome procedures for getting permits scare people off from making changes to their buildings (adding another floor or an extension). As long as you only want to refurbish then permits are not a problem, but as soon as you want to add something to the building it gets more difficult.

#### Individual-psychological barriers

- **Short term thinking**

Especially Private property owners often only see the initial investment costs and not the lifecycle costs.

- **Low priority of energy efficiency**

For many people, a designer kitchen or a jacuzzi is more important than good insulation or a sensible heating system. This shows that the costs are not decisive, but rather the ranking of priorities.

## **ii. Rating and Summary of the Barriers**

The stakeholders find many of the barriers to energy efficient refurbishment important, with physical-structural, economic and information barriers being perceived as most relevant. The important structural and physical barriers include the slowness of joint ownership decision-making processes (B1) that exists in Switzerland because of the high number of condominium apartment buildings with multiple owners. Another structural barrier, the lack of knowledge of the architects and installers (B6) is also perceived as important.

In regard to the economic barriers and with the exception of one of the stakeholders from the business sector, the high cost of refurbishment (B3) is viewed as either very important or important.

Relating to information barriers, the difficulty in identifying competent artisans (B2) is the most important barrier. Slightly less important are the lack of knowledge of home owners (B4) and the lack of cost transparency (B5). Of medium importance is the difficulty to identify the right information (B8), which one stakeholder from business sees as very important, but all the others either find being of little or medium importance.

Cultural-normative barriers are a little less important than the first three categories mentioned above. These concern the lack of interest of the architects and installers (B7) as well as the fact that the refurbishment has been pushed aside for quite a while in Switzerland.

Finally, the political barriers are perceived as being least important. Insufficient financial support for refurbishment (B9) and the lack of consistency in the policy framework (B10) both mostly found little support from the stakeholders.

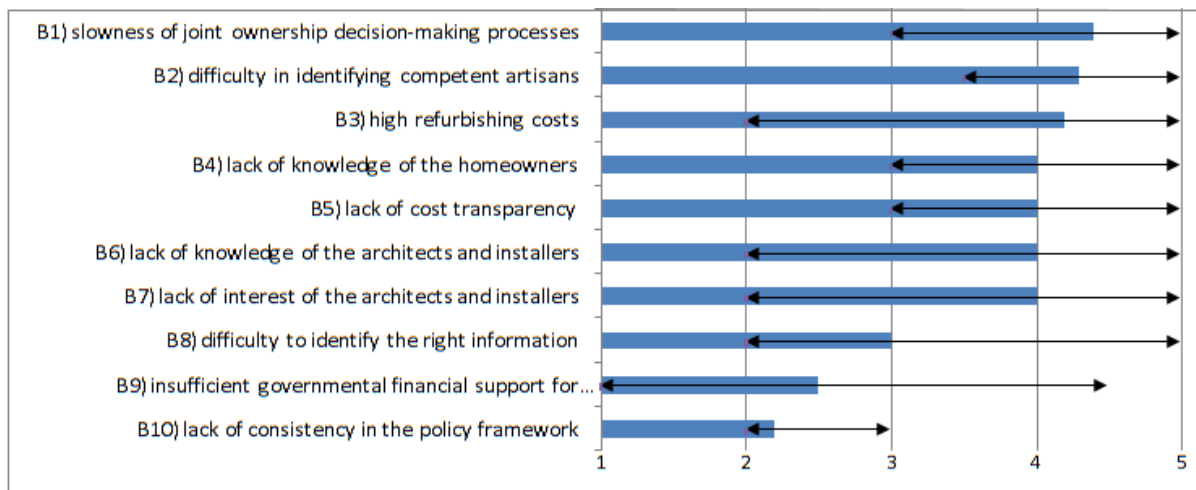


Fig. 3: Range of respondents' ratings of barriers to energy efficient refurbishment (from 0=no perceived barrier to 5=very important barrier)

### iii. Relevant Stakeholders

- **Artisans:** For single family homes, the artisans and contractors that implement the refurbishment have a lot of influence. Carpenters and joiners, who install windows or insulate buildings, need to inform the homeowners of energy issues (benefits, costs, etc).
- **Associations:** Influential associations like the Swiss Homeowner's Association could pass on relevant information to their members.
- **Architects, Engineers, Energy Consultants:** For larger projects, architects, engineers, and energy consultants are the key players.
- **Banks:** Banks are important in regard to their offer of special mortgages for energy efficient refurbishment.
- **State:** The responsibilities of the state include spreading information, communication, and further education. The direct financing of refurbishments should not be the focus since it is currently sufficient.

### 1.3.2. Past Attempts to Overcome the Barriers

#### Overcoming Political Barriers

- **Standardizing regulations in the cantons**

There have been attempts to standardize the financial support mechanisms across Switzerland, and efforts to improve the consistency of the policy framework have been attempted with the creation of the Model Cantonal Building Prescriptions (MuKE).

#### Overcoming Information Barriers

- **MINERGIE Label**

MINERGIE is a registered quality label for new and refurbished low-energy-consumption buildings. The label is mutually supported by the Swiss Federal Government, the Swiss Cantons, and the Principality of Liechtenstein along with trade and industry and it is very successful.

Those interested in building are made aware of MINERGIE by the banks offering special mortgages for MINERGIE compliant refurbishment (see below).

- **Awareness campaigns**

Efforts to improve knowledge and awareness about refurbishment for the purpose of energy efficiency have come at various levels. The Swiss Federal Office of Energy, the Swiss Homeowner's Association, the cantons, and others have attempted various awareness tactics to make homeowners more

knowledgeable and informed. So there are many points of contact run by the cantons with experts where consulting services and tips for home refurbishment are available.

Recent political activism has raised a lot of interest in refurbishment. The political discussions and activities have made many homeowners aware of the issues.

#### Overcoming Economic Barriers

- **Lower interest rates**

Many banks offer especially advantageous conditions on loans for refurbishments that are done according to the MINERGIE standard. These lower interest rates for MINERGIE loans is viewed as successful by most of the interviewed stakeholders.

- **Tax incentives**

In some cantons the cost of refurbishment for the purpose of energy efficiency can be deducted from the taxes. However, partial refurbishment is currently more beneficial than complete refurbishment. This will be improved substantially in the coming years.

- **Financial support from the cantons**

In some cantons financial support for energy efficient refurbishment is offered, though the support is small when compared to tax deductions. The success of such efforts may be seen in individual cases, but on the whole the effect is less visible. The amounts set aside for financial support are often very quickly used up.

- **"Climate Cent" ("Klimarappen")**

The "Climate Cent" is a voluntary initiative from the business community to avoid a carbon tax. With the funds raised from this initiative various efforts are supported, including building refurbishment. However, the criteria to receive funds is complicated and difficult to meet. In order to receive support one must, for example, engage in refurbishment in two separate areas (roof, windows, or façade) which involves large costs.

- **House check-up**

The Swiss Homeowner's Association offers homeowners a "house check-up" which shows potential energy savings.

#### Overcoming Physical and Structural Barriers

- **Education**

There are many courses offered to further educate architects. Also these offerings are taken advantage of and the programs are constantly being expanded, yet most architects have still not been reached. For example, for architects from the ETH (Swiss Federal Institute of Technology, Zurich), the most famous technical Swiss university, energy efficiency is barely brought up as an issue. For architects from technical schools (Fachhochschulen) the situation is better, but it is definitely not a central issue there either.

### 1.3.3. Possibilities for Future Actions

#### Overcoming Political Barriers

- **Changes in tax policies**

A new tax regulation that would allow for the costs of refurbishments to be spread over multiple years would make sense.

- **Improve consistency of policy framework**

Continued work is needed to improve the lack of consistency in the policy framework, as it is important that there is a single coordinated solution for an energy law for Switzerland, rather than a separate one for each canton. An example of a current legal regulation that is under consideration are the Model Cantonal Building Prescriptions (MuKE), on which cantons will have to agree if it is to become legally binding.

#### Overcoming Economic Barriers

- **Creating additional value**

Since the energy price is very low, it takes many years to make up for the refurbishment investment. For this reason the goal should not only be higher energy efficiency when refurbishing, but also other things should be done that add value or benefits such as adding more space.

#### Overcoming Information Barriers

- **Refurbishment managers**

In an initial neutral consultation a comprehensive integrated concept should be created. Specialists can rarely view projects from a broad perspective. After viewing the big picture, the property owner can turn to the various specialists.

This first consultation can be with an energy consultant, but it would be even more helpful to have people that are experts in all aspects of refurbishment, including aspects unrelated to energy. Such refurbishment managers must be well versed in tax questions, understand the concept of working in stages, know how one can get governmental financial support, and they should be able to organize and schedule the different jobs, etc.

- **Energy Performance Certificate**

This certificate classifies buildings from the point of view of energy quality. The building receives a label like the ones known from household appliances. The idea behind it is to be able to have ratings of buildings (A-buildings, B-buildings, etc.). This way the people will be able to see what kind of building they have and what kind of measures they would need to take in order to reach a higher classification. The goal is that renters looking for an apartment would not only look at the rental price, but also at the building's energy usage. This is an important effort that helps to improve awareness.

From the point of view of energy policy, the introduction of an energy certificate for buildings opens up an opportunity to initiate urgently required improvements to buildings in terms of energy efficiency. At the same time, the recommendation to carry out such improvements will yield direct benefits for property owners, and incentives are created for ensuring the more energy-conscious design and use of buildings.

The Energy Performance Certificates have already been introduced in some places in Europe, and Switzerland will be starting a voluntary test phase in August 2009 (cf. <http://www.geak.ch/>). Afterwards, the cantons will decide if they want to adopt the Energy Performance Certificates and if they decide in favor, which buildings to include (size, type, etc.). The certificate will cost approx. 200-300 CHF, and will most likely be the responsibility of the building owner.

The stakeholders had differing opinions regarding whether or not building energy certificates should be required by law. Most of the stakeholders shared the view that the certificates should be mandatory because otherwise they will not be paid attention to and it will take too long for them to become established in the market. However, representatives of the homeowners fear that a mandatory certificate would cost homeowners billions. They are afraid that all those whose homes have lower energy efficiency ratings would be downgraded and their homes would lose value. Then the banks could possibly send out letters demanding part of their mortgages back.

#### Overcoming Individual-Psychological Barriers

- **Marketing**

We need to transfer the mentality we have with regard to cars to buildings in terms of their use and maintenance. With cars we regularly take them in to be serviced and we change the oil (even when it is not necessary), while with buildings we are usually only willing to do superficial touch-ups.

#### Overcoming Physical and Structural Barriers

- **Teams of Artisans**

Ahead of refurbishment, building owners generally need a contact person. As an owner will not go straight to an architect when he only wants to refurbish the façade, it would be good if artisans got together in teams and present the customer with a comprehensive refurbishment proposal. This type of team building should be included in the training of artisans.

### 1.3.4. Windows of Opportunity

- **Change of ownership or renter**

When ownership or renter are changed, this would be a good opportunity to think not only about smaller smaller refurbishments, but also about improving the energy efficiency.

- **Partial refurbishment**

If a bathroom or a kitchen is being remodeled, energy efficiency measures should be considered at the same time. Artisans should bring such additional measures to the owner's attention. This is also important, if refurbishment is small (for example, a window needs to be replaced). One should refrain from purely superficial refurbishment.

## 1.4. Construction of Low Energy Houses

Barriers and attempts to overcome them in regard to the construction of energy efficient houses have been discussed with three stakeholders: two stakeholders from the business sector (energy sector, construction and building industry) and one stakeholder from academia.

The aspects discussed in this area are very similar to the previous section about refurbishment. In Switzerland energy efficiency in regard to new house construction is however actually a less urgent than in regard to refurbishment. There are not that many new houses constructed, and when new houses are constructed, energy efficiency is taken into consideration quite a bit (in regulations as well as in people's minds).

### 1.4.1. Barriers

#### i. Overview of each Barrier

The barriers identified in the area of low-energy housing were similar to those in the area of refurbishment, particularly with regard to the barriers dealing with the lack of knowledge and high investment costs.

##### Information Barriers

- **Cost transparency**

The lack of cost transparency is - besides the high initial investment costs - an important economic barrier. Initial costs are generally the most important for people, and only rarely are life-cycle costs discussed, which are more difficult to calculate. Stakeholders agreed that many people perceive MINERGIE homes as very expensive, even though the price difference has decreased dramatically in the past few years.

- **Difficulty finding the right partner (architect)**

For someone who really wants to build an energy-efficient home, finding an architect who is familiar with low-energy homes is much more difficult than just finding any architect, and it can take multiple attempts and more effort.

##### Economic Barriers

- **High initial investment costs**

The main reason for costs being a barrier is that initial investment costs are high. When a house is being constructed, the owner already has many expenses, so additional investments in energy efficiency seem especially high at this point.

##### Physical and Structural Barriers

- **Lack of knowledge of professionals**

The professionals' lack of knowledge is seen as a barrier. This is especially the case with architects (who sometimes know less than contractors about low-energy housing), but also contractors for larger buildings (like pension funds). Most of these people currently know very little about working with low-energy housing (MINERGIE).

### Cultural-Normative Barriers

- **Lack of will of professionals**

Because of the lack of knowledge, there is also no interest. When building a MINERGIE house for the first time, the architects and installers must learn all about them and perhaps take a course, etc. As long as they always have enough orders without MINERGIE, then they will not bother with it.

### Political Barriers

- **Insufficient governmental support**

Some stakeholders think it would be necessary to support more the more expensive energy efficient construction methods.

### Individual-Psychological Barriers

- **Lack of trust in new technology**

MINERGIE homes require comfort ventilation systems to be installed and many people are afraid because they do not really know what they are getting. Thus, people are reluctant to embrace this technology and build MINERGIE homes. Also, there are sometimes misinformation or "myths" associated with low-energy housing, such as that windows cannot be opened anymore, which contributes to this problem. The interviewed stakeholders do not see this barrier as having much importance these days.

- **Invisibility of energy-efficiency measures**

When building a house people want to get something visible and tangible with their money. For this reason the first things people invest in are beautiful bathrooms or kitchens rather than the less visible things that contribute to energy-efficiency such as insulation or advanced ventilation or heating systems.

## **ii. Rating and Summary of the Barriers**

Information barriers are perceived as being the most important in regard to energy efficient house construction. Most important is the lack of cost transparency (e.g. operating costs are rarely calculated) (B1). All stakeholders find this barrier either important or very important. Other information barriers as the lack of knowledge of homeowners (B6) and the difficulty to identify competent artisans (B7) are only of medium importance.

The economic barrier of the high initial investment (B2) is perceived as very important by most of the interviewed, but one stakeholder from the business sector views it as only being of medium importance.

Physical-structural and cultural-normative barriers are of about the same importance. The lack of knowledge of professionals (B4) - a structural barrier - is perceived as medium important to important by all the interviewees, whereas opinions were divided when it came to the cultural-normative barrier lack of interest of the architects and installers (B3), with one stakeholder finding it of little importance and another finding it very important.

Of the same importance is the political barrier of insufficient governmental support (B5). The lack of consistency in the political framework (B8) is however mostly perceived as not being an important barrier anymore.

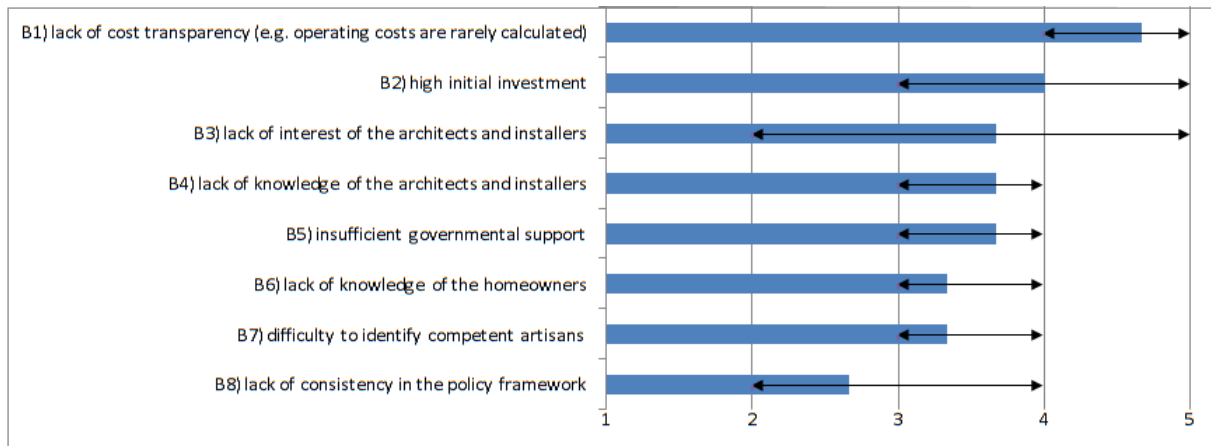


Fig. 4: **Range of respondents' ratings of barriers to construction of low energy houses** (from 0=no perceived barrier to 5=very important barrier).

#### 1.4.2. Relevant Stakeholders

- **Canton energy offices and consulting services**
- **Cantons**
- **Schools**
- **The press**
- **Architects and artisans**

#### 1.4.3. Past Attempts to Overcome the Barriers

Past attempts to overcome the barriers to the construction of low energy housing range from the development of the MINERGIE concept (a low-energy home), to further education and attempts to improve cost-transparency.

##### Overcoming Information Barriers

- **MINERGIE concept**

The MINERGIE concept (only known in Switzerland) is a voluntary standard that has had a large impact in overcoming barriers to low-energy housing. It defines how a building should be built in terms of energy efficiency and how much energy it can consume. Additionally, the MINERGIE standard requires that a comfort ventilation system is installed. In addition to the MINERGIE standard there is also MINERGIE-P (comparable to the passive house standard) and MINERGIE Eco. The spread of the MINERGIE standard has been aided by the fact that the concept has been clearly defined, and that the brand is trademark protected. The voluntary status of the concept could be seen as a disadvantage in that it could prevent an even greater spread of the standard.

- **Identification of competent artisans**

In order to ease the search for the right professionals (artisans, etc) a website was created where "professional partners" (people with the appropriate training) can be found. Unfortunately many people do not know that this information is out there. But it is there and the platform can be improved too.

- **Cost transparency**

In terms of attempts to improve cost transparency, life-cycle cost calculations are done in some cases, but still much too seldom. It is done more with investment income properties and rarely with privately-owned single family homes.

##### Overcoming Economic Barriers

- **High initial costs**

Besides some cantonal subsidies, no attempts to reduce costs have not been undertaken in the past, yet the costs have been reduced indirectly with the increased prevalence of low-energy housing and the related increase in know-how and experience.

- **MINERGIE mortgages**

Many banks offer specials for energy efficient building - mostly in relation with the MINERGIE label.

#### Overcoming Physical and Structural Barriers

- **Further education**

There are constantly improvements, new courses, trade shows, etc. where professionals can learn more.

### 1.4.4. Possibilities for Future Action

Future actions to overcome the barriers were categorized around reducing the cost barrier, improving knowledge and awareness of individual home-builders and professionals, and improving governmental (non-financial) support for low-energy housing.

#### Overcoming Economic Barriers

- **Cost transparency**

One way to improve cost transparency and make higher initial investments seem worthwhile would be to develop a standard that shows not only initial investment costs in a house, but also what the costs of then using and living in the house are (life-cycle costs). In addition to this effort, the extra costs of building low-energy homes should be brought as close to zero as possible. This depends on training, support, and especially experience. The goal would be for low-energy housing to become a “no-brainer” where no additional support is required. Stakeholders say this issue does not require more research, the knowledge is available, but rather the implementation needs more work, especially in the whole planning process.

- **Financial support from the government**

One stakeholder thinks that the availability of good financial support from the government would also further promote the construction of energy efficient buildings. Every person who builds a MINERGIE house should get this support and the subsidies should be very generous. It is important that the governmental support allows for long term planning, meaning subsidies should be guaranteed for multiple years.

#### Overcoming Information Barriers

- **Influence of the press**

The issue of energy efficiency and the topic of life-cycle costs needs to be brought to the public. The press could make a valuable contribution to the promotion of energy efficient buildings by featuring low-energy housing and making them well-known. Additionally not only the architect involved should be mentioned (which is often the case), but the entire team. Buildings are always a result of teamwork. If a building is to make sense energetically, there are always people like energy planners needed. Another problem in this area is that the appearance of a building is often made out to be the most important thing, and not its energy efficiency. There needs to be a shift towards a more holistic view.

- **Importance of primary and secondary school teaching**

The topic of energy should be dealt with more in lessons. Also schools could set an example if they were built following MINERGIE standards and this could then be talked about in class. Children should begin to view MINERGIE as normal.

- **Cantonal energy offices and consulting services**

These offices must inform the public in a professional and neutral manner. In Switzerland there are big differences between the cantons in regard to the activities of energy offices.

- **Role models**

Associations and unions (such as the installers association) could construct their buildings according to the MINERGIE standard to show that they can build in an energy efficient manner and to set an

example for the way to do things. Cantons can also provide strong support for MINERGIE by mandating that all cantonal buildings be built following the MINERGIE standard (as Bern has done). This leads to the topic of energy efficiency being discussed by the public.

- **Energy Performance Certificate**

(see refurbishment section)

#### Overcoming Political Barriers

- **New legal standards**

Starting in 2009 and 2010 the legal standard will be made more strict and will reflect today's MINERGIE regulations (except for the comfort ventilation). The MINERGIE standard itself will also be further tightened.

#### Overcoming Physical and Structural Barriers

- **Awareness and training of building professionals**

The topic of low-energy housing needs to be officially integrated into education and training. This applies to vocational schools (also for carpenters), universities, and technical colleges. Most professional installers have an adequate level of training in this area - it is the architects that have the least training in this area.

### 1.4.5. Windows of Opportunity

- **Homes about to be built:** It is important that owners are clearly shown that by building an energy efficient house they can minimize their costs for energy.
- **Homes about to be bought:** Many people buy homes and do not build new homes. They look at advertisements in newspapers. The real estate sector can play an important role here. Information about the efficiency of the homes should be published so that customers are informed and can compare homes based on this criteria.
- **Higher cost of energy**
- **Climate change discussions**

## 1.5. Energy Efficient Heating Behavior (Use)

Interviews on the topic of energy efficient heating behavior have been conducted with three stakeholders of the business level (construction and building industry, and bank) and one stakeholder from academia.

### 1.5.1. Barriers

#### **i. Overview of each Barrier**

##### Individual-Psychological Barriers

- **Lack of will**

Many people live with the temperature set at 24 degrees. This is a luxury that people can afford. Yet such a high room temperature is absurd when you consider that just one degree lower can reduce energy consumption by 7-10%.

- **"My behavior won't make any difference"**

##### Information Barriers

- **Lack of knowledge**

People do not have a clear idea of how they can influence energy consumption as inhabitants. Usually they know approximately what energy efficient living means, but they have no idea about the exact numbers, like how much energy is wasted when you leave the window cracked open all day.

### Structural Barriers

- **Cost of energy too low**

Energy inefficient behavior is not penalized. For example, people who always leave their windows cracked open will only pay a little more than others at the end of the year, because the cost of energy is still relatively low..

- **Poorly insulated walls or windows**

When there is bad insulation, the surfaces are cold, and as a consequence, people heat the room even more to make the room temperature relatively comfortable.

## ii. Rating and Summary of the Barriers

The stakeholders clearly view the individual-psychological barriers clearly as the most relevant. These include the lack of willingness of inhabitants to reduce the temperature in their homes (B1) and to a slightly lower importance the lack of willingness to air out rooms efficiently (B3).

Besides the lacking will, inhabitants also lack of knowledge about efficiently airing out rooms (B2), and sometimes also about healthy room temperature (B6).

The third relevant barrier category in this section is the physical and structural one: The lack of a thermostat is seen as an important barrier, however nowadays most Swiss apartments have a thermostat (B4).

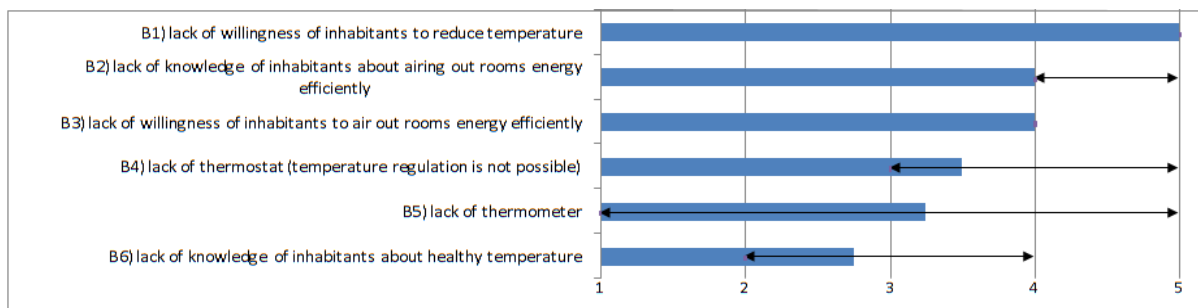


Fig. 5: Range of respondents' ratings of barriers to energy efficient heating behavior (from 0=no perceived barrier to 5=very important barrier).

### 1.5.2. Relevant Stakeholders

- **Homeowners or building managers:** They inform tenants about how to save energy.
- **Public authorities:** Public authorities are perceived as important in the context of informing the public.

### 1.5.3. Past Attempts to Overcome the Barriers

Very few past attempts to overcome the barriers were mentioned by stakeholders. This may be because, as one stakeholder noted, measures at the political level do not work in this area. One can regulate how to build, but one cannot regulate how people behave. The creation of incentives is the fundamental thing that needs to be achieved so that each individual can and wants to monitor and limit his/her own consumption.

- **Billing procedure for individual heating costs**

The idea behind this scheme is that people should be rewarded for efforts to save energy. (Rule: 60% is variable (based on the bill) and 40% is fixed (based on the number of square meters.)

- **Information campaigns**

There have been a couple of information campaigns to get people's attention about energy efficient heating. However, they were not very successful.

#### 1.5.4. Possibilities for Future Action

The main ways mentioned by stakeholders to possibly overcome the barriers to energy-efficient heating behavior were by improving knowledge and awareness, as well as through technical measures that will encourage energy efficient behavior (or not allow inefficient behavior).

- **Spreading information and raising awareness**

Cantons and municipalities should make energy efficient heating behavior an issue and offer the residents consulting services (through energy offices).

- **Technical measures**

Technical measures can achieve more than attempting to try to train people. One way is to remove potential sources of non-energy-efficient behavior. For example in the MINERGIE-P homes there are no more pivot-hung windows. In those homes you open the windows all the way or not at all. Allowing the consumer to look up his/her current energy consumption (e.g. through smart metering) would certainly help to get consumers attention and would provide them a real-time feedback. Another idea would be to connect home heating systems to the internet. When there are problems with the heating, then the heating specialist could try to figure out the problem using the internet and would not have to travel to the home. In addition, the usage statistics and information could be viewed online as well.

- **Making high oil prices an issue**

Heating costs are only paid once per year at the end of the heating season. If the costs end up being high, the consumer will be upset, annoyed, or even angry, but this is mostly forgotten by the time next winter comes. In order to combat this, consumers should be made aware of the high oil prices at the beginning of winter.

#### 1.5.5. Windows of Opportunity

- **Tenant meetings or info nights**

Once per year all the tenants gather for their yearly meeting with the owner of the building. That event would be a good time for the landlord to talk about energy efficient heating behavior and hand out informational pamphlets.

- **Change of tenants**

The new tenants must be shown how they can save energy. Proper use of the heater and other electronic devices needs to be explained.

- **The start of the "heating season"**

At the beginning of winter the consumers should be made aware of the high price of oil (through the media or energy consulting offices). They should be offered concrete tips for how save energy along with the amount of money they could save that way.

### 1.6. Summary of Area of Domestic Energy Use

The stakeholder interviews in the area of domestic energy use revealed common barriers at the institutional as well as the individual level.

Costs are often mentioned as an important barrier. The currently low energy prices bring no incentive to save energy, neither in the purchase phase nor in the use phase. Financially it does not bring much benefit to change your behavior in regard to energy use, or to invest in energy efficiency or in new energy sources such as solar. Sometimes, this can be a real problem, e.g. in the case of solar power which is much more expensive than other forms of electricity. However, sometimes the higher cost is primarily linked to the consumers' perception or mode of calculation, resp. the information provided. The price difference of green power and conventional power are for example usually greatly overesti-

mated by the consumers. In regard to refurbishment and house construction, consumers usually think short-term and do not consider life-cycle costs.

Another problem linked to costs is the high initial investment. This is a barrier in regard to the installation of PV panels, energy efficient refurbishment, and house construction.

However, in all sections, at least some stakeholders mentioned that there are other barriers, and overcoming them could achieve quite a lot.

Barriers mentioned are quite similar in the fields of PV, refurbishment and new house constructions.

Within these fields, cultural-normative and physical-structural barriers are quite important. These regard especially the lack of knowledge and interest of professionals, especially architects, and artisans regarding refurbishment.

The lack of knowledge of homeowner is generally perceived as a less important barrier, but still quite important in the field of refurbishment and PV.

Political barriers are important especially regarding PV.

Individual-psychological barriers are also of high importance. A big investment like home refurbishment or the installation of solar panels must always compete with other big investments such as a new car or kitchen, and often the priority is given to the latter.

The purchase of green power and the heating behavior regard not only homeowners but everybody and the consumers are (except for some exceptions) the main decision-makers. Also, in these fields, no big investments are necessary. Barriers are thus slightly different. In these areas, the lack of problem awareness and concrete information (regarding the source of the power and the energy consumption) are seen as an important barriers. Power and heating energy are simply provided to consumers often do not care about. In regard to heating behavior, consumers lack knowledge about which behavior has which impact as they only receive the heating bills once a year. If they would get immediate feed-back about their energy consumption, this would motivate them to change their behavior.

Regarding the measures that are required to overcome the barriers, most stakeholders agree that in most fields (except PV) the current levels of financial support offered by the government is sufficient. Thus they would rather use the existing supportive mechanisms. What is important is that the support is consistent and long-term.

Marketing is seen as an important instrument and much can still be done in this area. In the field of PV, the target groups are those that have enough money. For effective and sensible marketing strategies to be developed, there needs to be research done into what values are important to this target group. In regard to green power, the value of green power needs to be communicated.

Education is perceived as another key area, both for individual homeowners and for professionals working in refurbishment. At the individual level, when people decide to refurbish, they need to be informed about the available alternatives and the costs of these must be transparent. As for the training of professionals in refurbishment, this concerns architects, planners, energy consultants, and all those to carry out the construction; many cannot properly work in this area. The costs of energy efficient construction could be lowered through better knowledge and implementation of efficient solutions.

Legal regulations, e.g. Model Cantonal Building Prescriptions are generally perceived as the most efficient instruments to move towards a sustainable energy system.

## 2. Area of Household Appliances

### 2.1. Energy Efficient Appliances (Purchase)

In regard to the purchase phase, seven stakeholders, were interviewed: One stakeholder from the political level, two stakeholders come from semi-public institutions, three stakeholders from the business sector, and one from an NGO.

#### 2.1.1. Barriers

##### i. Overview of each Barrier

When discussing the purchase of large energy-efficient kitchen appliances (like refrigerators and stoves) one must differentiate between different groups of buyers. On the one hand there are private buyers (homeowners or renters) and on the other hand there are professional buyers (landlords, investors, architects, cabinet makers, etc.). These groups have different interests and motivations. The main difference is that the former use the appliances themselves and consequently must pay for the energy costs arising from their use. Professional buyers do not pay for the energy costs themselves and thus often have other interests such as design, margins, or getting the lowest possible purchase price. Landlords, for example, generally buy the cheapest devices because they do not want to deal with increases in rent. This distinction is especially relevant in Switzerland because, as mentioned above, a very high portion of population rents.

Consumers have the decision making power when it comes to smaller devices, like pans. For this reason, we also analysed the purchase behavior of cooking pans in addition to that of larger appliances like refrigerators.

##### Individual-Psychological Barriers

- **Lack of will**

The lack of will is of very high relevance. The main reason for the low number of purchases of energy efficient appliances is usually the **higher initial cost**. Many consumers think in the short-term. They only see the initial purchase price, while the complete life-cycle costs are not paid attention to or are unknown. This is an important or even very important barrier for all the interviewees.

Energy efficiency is also **not a first order buying criteria**. Price and design are usually the main criteria. The latter plays an important role because the kitchen represents the style and aesthetic taste of the homeowner. Performance is valued as an important criterion, especially by cooking fanatics.

In addition, **energy efficiency is not a relevant part of the utility function**. Consumers are ready to pay more for design, size, etc., but not for energy efficiency.

- **General tendency toward accumulation of appliances**

The general tendency toward the accumulation of appliances is perceived as an important barrier by stakeholders from the NGO and the political level. Stakeholders from semi-public organizations see this as a barrier of medium importance, while representatives from the business sector view it as a barrier of minor importance.

##### Information Barriers

- **Awareness of the connection between purchase and energy issue**

While awareness of energy issues is generally present, when it comes to the purchase of an appliance or cookware, the connection to energy efficiency and energy use is not always made. All interviewees see this as an important barrier. This is especially the case with the purchase of cooking pans, because they themselves do not use energy. When purchasing a refrigerator, it is the refrigerator that stands in the foreground, but thanks to the energy labels, the connection to energy consumption is more apparent.

- **Attention paid to energy label**

There are still consumers who are unfamiliar with the energy label.

#### Economic Barriers

The economic barriers are perceived to be important to very important. They include the high initial cost and the low price of electricity.

#### Political Barriers

- **Problems regarding labeling**

In general, labels are seen as very successful in the eyes of all the interviewed stakeholders. Unfortunately, the label rating criteria were not adjusted early on to account for the improvements in appliance efficiency, especially refrigerators. This has led to the current situation where ratings on the labels of some refrigerators (as well as freezers) are unclear and easily misunderstood. Normally, the rating scale goes from A to E, with the best appliances receiving an A rating and the worst an E rating. Yet due to innovations in efficiency, there are no more appliances in the lower rating categories for these products. Instead of lower ratings for the less efficient appliances, there are A+ and A++ ratings for the more efficient appliances. As a result of this rating system, A-rated appliances are now among the worst appliances available on the market. This is confusing for customers.

Except for two stakeholders, the interviewees see this as a very important barrier. The political level stakeholder sees this as a barrier of medium importance, a stakeholder from business saw it as less important. The latter mentioned that an A-labeled appliance is not bad. However, a revision of the labeling is seen as necessary by all stakeholders.

#### Cultural-Normative Barriers

- **Distrust in labeling**

All stakeholders agree that in general, consumers trust the labeling and the media. The NGO stakeholder is not sure of this point and sees distrust as a barrier of medium importance.

#### Physical and Structural Barriers

- **No labeling for cooking pans**

Swiss cooking pan manufacturers think such labeling would make sense to advise customers on the relation between pans and energy use. They produce pans that are of good quality and as a result they allow for energy-efficient cooking. A label would make this added value more visible and show the consumers that the more expensive price is justified.

- **Incompetent salespeople**

It is the responsibility of the salespeople to point out the relevance of the labels and to answer concrete questions regarding the energy consumption of appliances. From the point of view of most of the interviewed stakeholders, the salespeople are often not trained enough to competently advise consumers. They rate this barrier as one of medium importance. The stakeholder from the NGO considers this point more important, a stakeholder from business as one of less importance. When consumers are deciding between two products and one of them is significantly less expensive, the added value of the more expensive product needs to be clearly presented by salespeople, otherwise the less expensive appliance will be purchased.

- **Distribution channels**

Refrigerators are rarely bought in retail stores. Homeowners order these appliances through architects, plumbers, or cabinet makers, etc., and the professional purchasers often buy these directly from the manufacturer. Thus these actors have a large influence on purchase decisions. Most of them are less informed than the salespeople in stores and often have other priorities. Architects, for example, are usually most concerned with design and energy efficiency is rarely a criterion for them. In addition, more and more products are being purchased online or in stores without salespeople. In these cases the manufacturers are trying to include comprehensive explanations in their product descriptions and on the packages.

## ii. Rating and Summary of the Barriers

The economic barriers are perceived to be important to very important. They include the high initial cost (B1) and the low price of electricity. Regarding the high initial price, some stakeholders mentioned however that if lifecycle costs were calculated, costs of energy efficient appliances would not anymore be so high.

Next are the information and political barriers, followed by the individual-psychological ones. The decision to buy an energy-efficient appliance or cookware begins with awareness about general problems related to energy use and those related to the specific appliance or cookware. While awareness of energy issues is generally there, when it comes to the purchase of an appliance or cookware the connection to issues of energy efficiency and energy use is not always made. All interviewees see this as an important barrier (B2). Another important information barrier is the lack of lifecycle cost information. Political barriers exist in regard to the labeling. In general, the labels are seen as very successful in the eyes of all interviewed stakeholders. Unfortunately the label rating criteria were not adjusted early on to account for the improvements in the efficiency of appliances, especially refrigerators. Except for two stakeholders (business and political level), the interviewees see this as a very important barrier (B3).

Despite the available information, and knowing that it is important to deal with natural resources in a responsible manner and important to purchase energy-efficient appliances, many consumers still decide not to buy them. Individual-psychological barriers, and especially the lack of will, are of very high relevance. The main reason for such decisions is usually the higher initial cost (B1). Energy efficiency is also not a first order buying criteria (B4). Price and design are usually the main criteria. The general tendency towards accumulation of appliances is perceived as an important barrier by stakeholders from the NGO and the political level (B6). Stakeholders from semi-public organizations see this as a medium barrier, while representatives from the business sector view it as a barrier of minor importance.

In regard to information, salespeople have an important role. From the point of view of most of the stakeholders, the salespeople are often not trained enough to competently advise the consumers (B5). They rate this structural barrier as one of medium importance.

Regarding cultural-normative barriers, the interviewees the trust in labeling and the media. All stakeholders agree that in general, consumers trust the labeling and the media (B8).

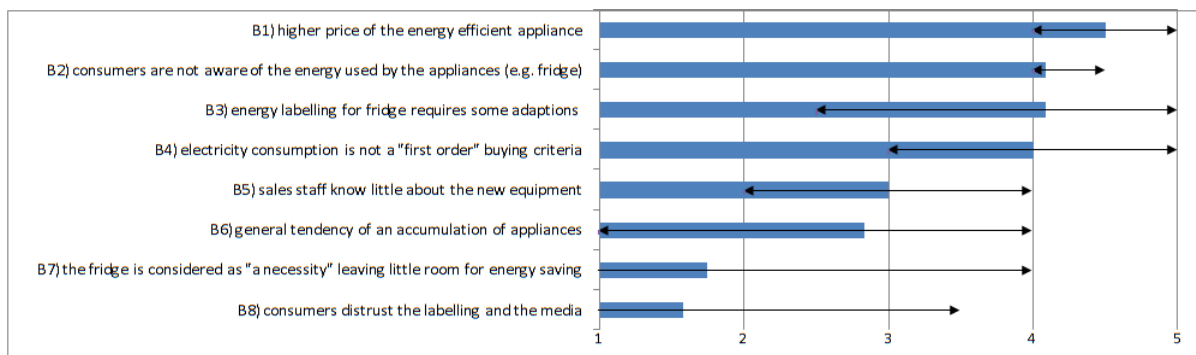


Fig. 6: Range of respondents' ratings of barriers to the purchase of energy efficient household appliances (from 0=not perceived barrier to 5=very important barrier).

### 2.1.2. Relevant Stakeholders

- **Salespeople:** Competent advising, mentioning the energy consumption to customers
- **Political decision makers:** Labeling, voluntary agreements with businesses (e.g. household appliance industry) and electric utilities, and obligations (introduction of minimum standards)
- **Household appliance industry:** Manufacturing of energy efficient appliances
- **Schools and educational institutions:** There should be more emphasis on the subject of energy efficiency at schools and trainings for salespeople.

### 2.1.3. Past Attempts to Overcome the Barriers

#### Overcoming Information Barriers

- **Energy labels**

Energy labels have contributed a great deal to improving the problem of a lack of information about the efficiency of many appliances.

- **Awareness raising about the energy problem**

Awareness has increased markedly in recent months thanks to media coverage of energy and energy-efficiency. Especially consumer magazines like to report about topics in this area. One can also find these topics covered consistently in daily newspapers, sometimes in special sections dedicated to energy efficiency and particularly efficient devices. The reporting done in the daily newspapers is very important since these reach a much larger audience than specialty magazines. The latter are read primarily by those customers who are already aware of these issues. Television and radio also help spread information to make the population more aware of energy issues. There are several television programs dedicated to informing consumers that have been very successful. Constantly informing the public is important, because otherwise the topic will be forgotten once again. Nevertheless the topic of energy is still abstract. Many people do not know what a kilowatt hour of electricity is.

#### Overcoming Cultural-Normative Barriers

- **Competent Salespeople**

Manufacturers are making an effort to educate salespeople, but the job of training these employees is actually the responsibility of retailers. To solve the problem of incompetent salespeople, some manufacturers have their own personnel in high-traffic retail stores. These personnel are well trained and know the products.

### 2.1.4. Possibilities for Future Action

In the interviews, several relevant fields of action und stakeholders were identified. Actions mentioned by the interviewed stakeholders can be classified in three basic ways to increase the number of energy-efficient appliances that are bought.

- **Convince consumers of the importance of energy efficiency to encourage participation in voluntary measures**

Much has already been done in this area in the past. There is quite a bit of information available, but it is necessary to keep up the work of informing the public. The goal is to make awareness of energy a part of our culture.

Political decision makers are important stakeholders in this respect. The influence of politics begins with information, labeling, and voluntary agreements. These non-binding measures have played the most important role in politics up to now.

Much was achieved by creating **energy labels**. They are currently undergoing intense revision. The goal is to create a meaningful labeling system. The new labels should include numbers, letters, and colors, and they should be dynamic, meaning they should be able to adjust to improvements in energy-efficiency. For cooking pans there are neither energy labels nor information about their energy consumption on the pans. The introduction of labels for pans seems to make sense for two reasons. First, customers would be made aware of the amount of energy used by cooking pans. Second, a good base of information would be provided. From the point of view of the Swiss cooking pan manufacturers, labeling for cookware is especially attractive because they produce pans of high quality which are both more energy efficient and also generally more expensive than those of foreign competitors. The label should be initiated by a neutral organization or association. Besides declaring the energy consumption and energy efficiency, the label should also include production criteria such as environmental impact and no child labor.

In addition, there are also **agreements between the SFOE (Swiss Federal Office of Energy) and the household appliance industry** regarding the criteria for the approval of various types of devices. These agreements are viewed as very sensible by stakeholders in politics and industry. Further, manufacturers should indicate the life-cycle costs of the appliances. The energy savings should be presented in monetary units or in the amount of CO<sub>2</sub> saved. Through good communication and marketing, energy efficiency could come to be viewed more positively and, above all, become more in the eyes of consumers. Manufacturers could also contribute to this effort by referring to the energy efficiency of their appliances in their advertising. As a result, customers would be prepared to pay more for energy efficiency, as they do for savings of CO<sub>2</sub>.

**Electric utilities** form another important stakeholder group. According to the Swiss Constitution they are responsible for fostering energy efficiency. To do this they offer special promotions such as discounts on energy efficient devices. The electric utilities play a very interesting role because they have an advantage: direct customer contact. By now many have realized that the big issue of security of energy supplies is linked to energy efficiency. The electric utilities could be much more creative and should also be working together with other actors such as schools. Another instrument to reduce electricity consumption would be target agreements or certificates with electric utilities. In order for the targets to be met, the utilities must manage to get their customers to change their behavior to use energy more sparingly. Certificates are efficient, but expensive, since the effective implementation of them requires much effort.

**Schools and educational institutions** also play an important role. There should be more emphasis placed on the topic of energy efficiency. 'Energy weeks' are always a big success. However, the topic should not only be touched upon in special events, but be solidly integrated into the lesson plan. Children and adolescents up to the age of 16 are very interested in the topic of energy efficiency. Children may talk with their parents about it. Furthermore, the training of salespeople is also very important. The energy issue must be given higher importance in training. Moreover, further education is necessary to inform the salespeople about newer devices.

Nevertheless, a perfectly informed customer will never exist. The goal should be to see to it that consumers know approximately what energy efficiency is and can use the concept in context. This basic understanding has been achieved with CO<sub>2</sub>: Global warming or climate change is a result of CO<sub>2</sub>.

Convincing consumers is only possible to a certain degree. There will always be consumers who cannot be convinced of the importance of energy efficiency. This means that there is a need for other measures in addition to voluntary measures.

- **Sell energy efficiency as a side effect**

A second possibility to increase the purchase of energy-efficient appliances would be to sell energy efficiency as a side effect. **Price-conscious consumers** can be persuaded to purchase energy efficient devices using incentive programs. Such incentives can come from the federal or cantonal levels, the manufacturers, or the electric utilities. Not all interviewees are convinced that the subsidies for efficient devices make sense. To increase the speed of the replacement of older appliances, a scrapping premium would make sense. Incentives are also important for salespeople. One could, for example, increase the margins received for the sales of energy efficient devices. Consumers, who value **design** and **brands** when purchasing appliances would be easily influenced to buy energy efficient devices if they had a good design or were made by certain brands. In this case energy efficiency is 'only' a positive side effect. To foster this, a design competition could be held.

- **Enforce regulations and minimum standards**

Instead of supporting the sales of the best appliances to increase their share of the market, one could remove the worst ones from the market. That way no costs would be created. The third possibility to increase energy efficient appliance purchases is thus to only allow efficient appliances on the market. The relevant stakeholders in this situation would be **politicians**. They have the ability to introduce regulations and minimum standards and to forbid inefficient appliances. Such measures were viewed as fundamentally important and very sensible by all interviewees because they make it possible to get the inefficient goods off the market. Industry representatives find it important that **manufacturers** are consulted when it comes to creating reasonable minimum requirements. There is plenty of potential in

this area. Regulations are basically well accepted and can be made stricter in the future. The manufacturers are of course also important stakeholders in this area.

Due to the large percentage of renters in Switzerland, landlords play a prominent role. On one hand they are responsible for acquiring the appliances and on the other hand they have direct contact with the renters and can give them information about the proper use of the appliances.

### 2.1.5. Windows of Opportunity

- **Moment of purchase decisions**

The moment when consumers are deciding on which appliance to purchase is critical for salespeople or manufacturers. The information they provide has the biggest impact when it is given during the decision making process at the time of the purchase.

- **Replacement of an appliance**

When an appliance breaks and needs to be replaced, it makes sense to raise the owner's awareness of the energy issue and to advise them to buy an energy-efficient appliance.

- **Remodeling**

There are ample opportunities to influence decisions during remodeling. Many times when kitchens are being remodeled, all of the appliances are replaced. Architects and installers play an important role here, which is why their training is very important.

## 2.2. Cooking and Baking (Use)

The identification of experts in regard to the use phase is critical. In the end, six stakeholders, two women and four men, were interviewed. These interviewees either did studies about energy efficient behavior of consumers (including their cooking practices), campaigns to encourage energy efficient cooking, or discussed this subject in their area of work and with scholars. Some of the interviewed stakeholders' knowledge also comes from their personal experiences i.e. their own cooking practices or those of their family or friends.

Six stakeholders were interviewed about cooking and baking behaviors: one stakeholder from a semi-public institution, three stakeholders at the business level, one person from an NGO, and one stakeholder from academia.

### 2.2.1. Barriers

#### i. Overview of each Barrier

##### Individual-Psychological Barriers

- **Lack of will**

The lack of will and interest in saving energy are currently the big barrier. When cooking the main thing that matters is the taste – the meal should taste good and should also be relatively fast to prepare and healthy. To pay attention to energy efficiency on top of all that is too complicated for many consumers. Reasons for the lack of will are the low price and invisibility of electricity.

- **Habits and patterns of behavior in the area of cooking**

Another large barrier is made up of habits and patterns of behavior in the area of cooking. These habits are extremely difficult to change as consumers are usually not comfortable with changing their behavior. To buy an energy-efficient appliance once is significantly easier than putting the lid on the pan when you are cooking every time. As a result, information campaigns in which people do not have to change their behavior tend to be more successful.

### Information Barriers

- **lack of specific information about energy efficient cooking**

Often awareness about energy efficiency and information about what specific actions needed to cook in an energy efficient manner are missing. For most consumers, cooking is mainly about good taste, healthy and/or quick preparation. So many do not think about whether it is worth to put the lid on the pan. Many consumers do not know what efficient cooking is and how much energy they could save through different activities.

In addition, consumers know too little about how to wisely and optimally use household appliances and new technologies. For example today there are many appliances that have similar functions to ovens. Some of them are reasonable, complimentary additions to the kitchen while others are just one more unnecessary device in the kitchen.

- **Difficulty of finding the correct information**

This difficulty is perceived as an important barrier in the point of view of stakeholders from business. Stakeholders from semi-public organizations and the NGO think, however, that there is enough information available and if somebody looks for it, it is not difficult to identify.

### Economic Barriers

Economic barriers such as the low price of electricity lead to a situation where there is no incentive to change behavior. As long as behavioral changes do not impact or only minimally impact consumers' wallets, consumers will not see any incentive to change. The higher the price of electricity, the more people are willing to think about where they can potentially save. The price of electricity will have to be substantially higher than it currently is in order to be an incentive to change behavior.

### Physical and Structural Barriers

- **Lack of immediate feed-back**

The fact that one does not see how much energy is used when cooking and how much could be saved through different activities is perceived as being important or of medium importance by all interviewees.

- **Incompetent salespeople**

To find the correct information with little effort is often very difficult. The salespeople could be helpful places to start, but are, with the exception of specialized stores, usually not trained enough in the area of energy efficiency. Low energy cooking also does not benefit the retailers or manufacturers.

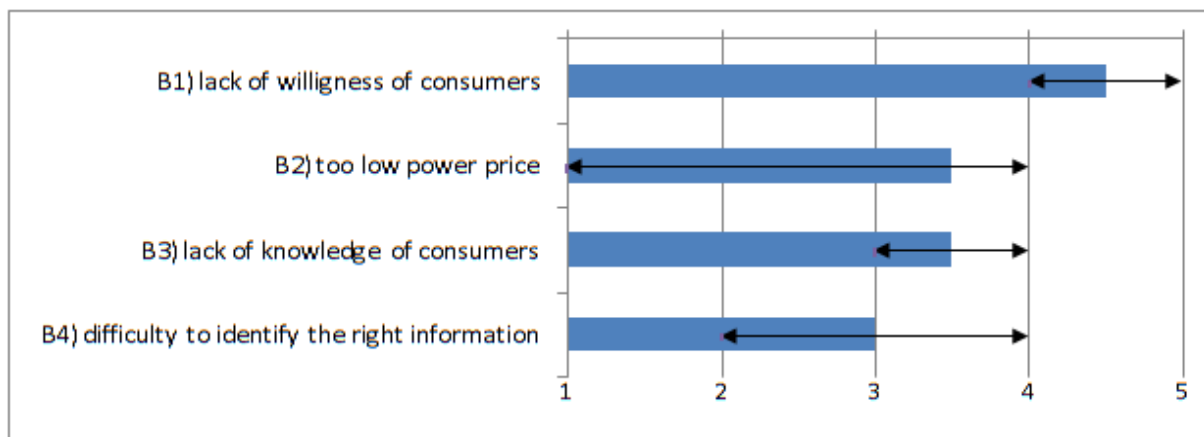
## **ii. Rating and Summary of the Barriers**

The barriers to energy efficient cooking are mainly individual barriers. The biggest barrier from the point of view of all stakeholders is lack of will and lack of interest in saving energy (B1). This is related to the fact that it is extremely difficult to change habits and patterns of behavior.

The individual barriers are to some extent influenced by economic, information, and structural issues. Regarding the economic barriers, except for the stakeholder from a semi-public organization, all stakeholders agreed that the low cost of electricity (B2) are a relevant barrier to energy efficient cooking.

Of the same importance than economic barriers are information barriers. A majority of the population knows that they can influence their energy consumption through their behavior. However, awareness about energy efficiency is often missing as well as the knowledge about what specific actions are needed to cook in an energy efficient manner (B3).

The importance of this knowledge barrier is thus strongly influenced by a structural barrier, the fact that one does not see how much energy is used when cooking and how much could be saved through different activities. This barrier is perceived as important or of medium importance by all interviewees. The difficulty of finding the correct information also leads to a lack of knowledge. This difficulty is perceived as an important barrier especially from the point of view of stakeholders from business (B4). Stakeholders from semi-public organizations and the NGO think, however, that there is enough information available and if somebody looks for it, it is not difficult to identify..



**Fig. 7: Range of respondents' ratings of barriers to energy efficient cooking (from 0=no perceived barrier to 5=very important barrier).**

## 2.2.2. Relevant Stakeholders

- **Consumers:** They need to be ready and willing to change their behavior.
- **Schools:** They are perceived as an important stakeholder regarding the spread of knowledge.

## 2.2.3. Past Attempts to Overcome the Barriers

### Overcoming Information Barriers

- **Information campaigns**

Campaigns from NGOs, the federal government, and the media made some information campaigns in the recent months. Also there have been various campaigns and informational brochures in the past from the Swiss Federal Office for Energy, industry and consumer group initiatives (such as eae), and NGOs like WWF. Those who wish to inform themselves can find much information on the internet. In general there is a lot of information out there; the question is if it actually reaches the consumers.

## 2.2.4. Possibilities for Future Action

To foster energy efficient cooking there needs to be **more concrete information** for consumers and **the consumers need to be ready and willing to change their behavior**. These are voluntary measures because no one can be forced to change their behavior. There are thus not so many options open for politicians in the use phase as compared to the purchase phase. An intervention with political regulations or bans, such as the establishment of minimum standards, is not possible in this area.

**Schools** can make an important contribution to the spread of knowledge. Cooking schools should emphasize energy efficiency and the students should receive tips and suggestions on how to cook energy efficiently. Since many students have barely cooked before and have not developed habits yet, this is a very good opportunity to make them aware of their energy use.

Moreover, energy efficient cooking should also be a topic taught to **household appliance salespeople**. They would then be able show the consumers how to properly use the appliances to maximize their energy efficiency while cooking.

Consumers should be exposed to energy efficient cooking tips in as many different places as possible. In some **newspapers and magazines recipes** are featured every once in a while. Next to the preparation instructions there are often things like the preparation time, the level of difficulty, and the calorie content listed. In addition to these, there could also be tips for energy efficient cooking mentioned.

Economical cooking suggestions could be integrated in the usage instructions for stoves and pans. Energy saving preparation **tips could also be placed directly on food packaging**. For example, on a pizza box it could say that it makes more sense to heat a piece of pizza in a pan with a little oil than to bake it in the oven. In cookbooks the issue of energy efficiency could also be featured more prominently. Furthermore, at cooking demonstrations or on cooking television shows the viewers could be taught about energy efficient cooking. It would make sense to work with famous chefs. They could definitely help spread proper cooking habits to a larger audience, and even more importantly, the topic of energy efficiency while cooking would become more prominent.

### 2.2.5. Windows of Opportunity

- **Cooking at school**

It is best when wasteful energy habits are not learned at all. That is why cooking schools offer a promising window of opportunities.

- **Cooking demonstrations**

In cooking demonstrations and cooking television shows the information reaches an interested audience that can immediately use what they have learned in their own cooking.

- **Purchase of a new appliance**

At the time of purchase buyers should be informed about proper use of the stove and about energy saving tips. This information can be shared verbally by salespeople or it can appear in the instruction manual that comes from the manufacturer. The best scenario would include both communication methods.

- **Building a house or moving into a new apartment**

The new renters should be informed about the energy-efficient use of appliances in the apartment by the landlord or building manager.

- **Birth of a child**

Young parents often think about saving energy more than others. Mothers could be informed about saving energy in women's magazines or while shopping.

## 2.3. Summary of Area of Household Appliances

This analysis of the barriers to more efficient cooking has shown different structural, institutional and individual barriers. The stakeholder interviews have disclosed that most of the barriers in regard to the purchase and the use phase are individual ones. These are however also influenced by structural and institutional barriers. The most important barriers are individual-psychological barriers. Their importance is supported by economic barriers such as the higher initial cost and the low power price. Knowledge barriers are of lower importance in most areas, but become important if the information is either not available or is unclear. The first is the case when there are structural barriers such as the lack of labeling for cooking pans, the invisibility of electricity use when cooking, or insufficiently educated sales people. The second is the case of misleading labeling ratings, which is a political barrier. Knowledge barriers are also influenced by cultural-normative barriers, such as the attention paid to the labeling and the level of difficulty to identify the information.

We have pointed to different areas where changes could be made. In regard to the purchase phase, the dissemination of knowledge is important. Information dissemination (including labeling) and voluntary measures have thus far been the most widely-used measures in Switzerland. All interviewees agree that only a certain part of the population can be reached with these measures. As a result, they consider obligatory measures very important, and policy makers as the most relevant stakeholders. The interviewees from business pointed out that for sensible regulations, policy makers need to work together with business representatives.

Achieving a change in patterns of use is definitely more difficult. Since obligatory measures are not possible, information plays an even more important role. The most efficient measure however, is to

prevent bad patterns of use from becoming habits. So, cooking at school has a prominent role, and cooking teachers should attach high importance to energy efficient cooking practices.

## 3. Area of Mobility

### 3.1. Public Transport (Use)

We interviewed three stakeholders about barriers to the increased use of public transport all of whom were from political authorities.

#### 3.1.1. Barriers

##### i. Overview of each Barrier

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.

##### Economic Barriers

- **Cost of driving too low**

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

- **Driving is comfortable and habitual**

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

- **Infrastructure has been neglected**

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.

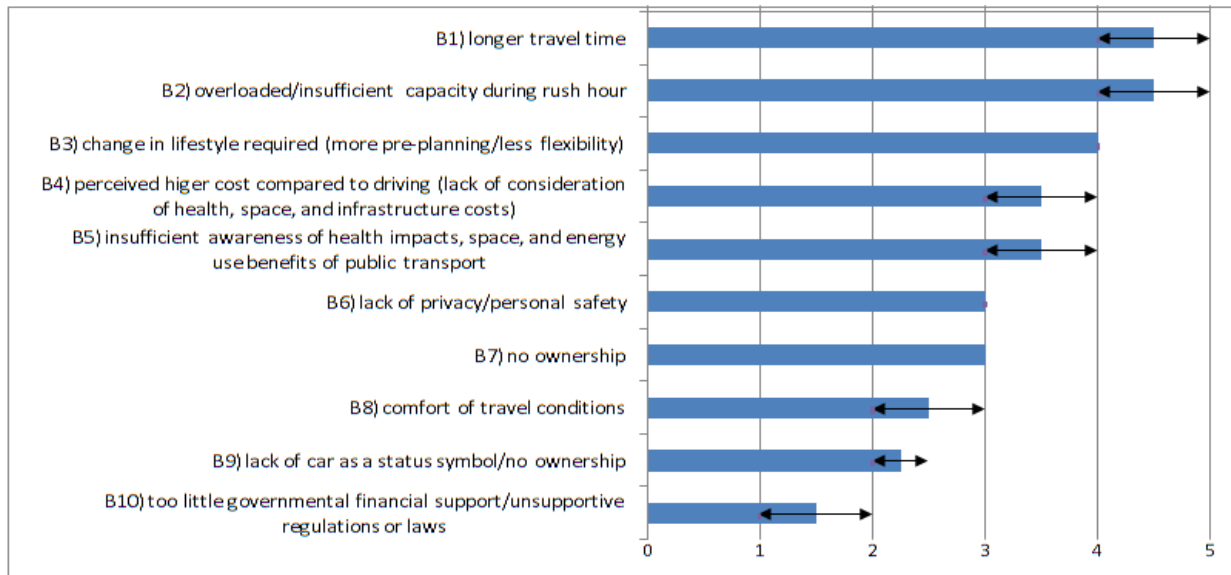
##### Information Barrier

- **Insufficient awareness of detrimental effects of driving**

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.

##### ii. Rating and Summary of the Barriers

The average ratings for barriers to public transport in Switzerland indicated that physical and structural barriers are among the most important barriers, as seen with the high importance ratings of B1) and B2), for the longer travel time required to use public transport and capacity problems. Next most important was individual psychological barriers related to habits, in the barrier of a required change in lifestyle for B3, which interviewees also ranked as being highly important. Informational barriers seemed to be somewhat substantial with B4 and B5, but were not seen as quite as important. Also, interviewees agreed that the is support from the government (B10), and that the lack thereof does not pose a serious barrier compared to individual willingness to change.



### 3.1.2. Relevant Stakeholders

- **Federal Offices in Switzerland:** Governmental bodies play a role in the determination of oil prices in the country (through taxes, etc.) and are also responsible for building roads and transportation infrastructure.
- **Public transport companies (SBB, for example in Switzerland) and public transport organizations (Verbände des ÖV):** Marketing by these companies and organizations could affect ridership, and in addition, the transport companies could also have a role in reducing the cost barrier

### 3.1.3. Past Attempts to Overcome the Barriers

#### Overcoming Structural Barriers and Individual Psychological Barriers

- **Infrastructural improvements**

Various efforts to overcome barriers in the area of public transport have made it an option competitive to the personal car. According to a stakeholder in policy, 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** 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** was questioned by some stakeholders: 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), though at the time of the interviews, accounts of their success or lack thereof was unfortunately missing.

Many of the above projects have made connections and travel time better, and in many cases, while congestion of roads is worsening, train congestion is lessening, making trains faster than driving. The introduction of car-sharing as a new innovation has addressed a need for cars that can be used in conjunction with public transport, again making public transport more convenient.

#### Overcoming Information Barriers

- **Public awareness raising**

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 behaviors 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.

### 3.1.4. Possibilities for Future Action

#### Overcoming Structural Barriers

- **Continued improvement of infrastructure**

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.

#### Overcoming Economic Barriers

- **Reducing the cost barrier**

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.

#### Overcoming Information Barriers

- **Continued and increased efforts in public awareness**

Show the external costs of cars such as pollution, accidents, congestion, etc, so that people would be more aware of these costs associated with driving.

## 3.2. Short Distance Mobility

We interviewed three stakeholders about barriers to the decreased use of cars for short distance trips: two were from political authorities, and one was from an NGO.

### 3.2.1. Barriers

#### **i. Overview of each Barrier**

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.

### Physical and Structural Barriers

- **City planning and infrastructure focuses on cars**

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.

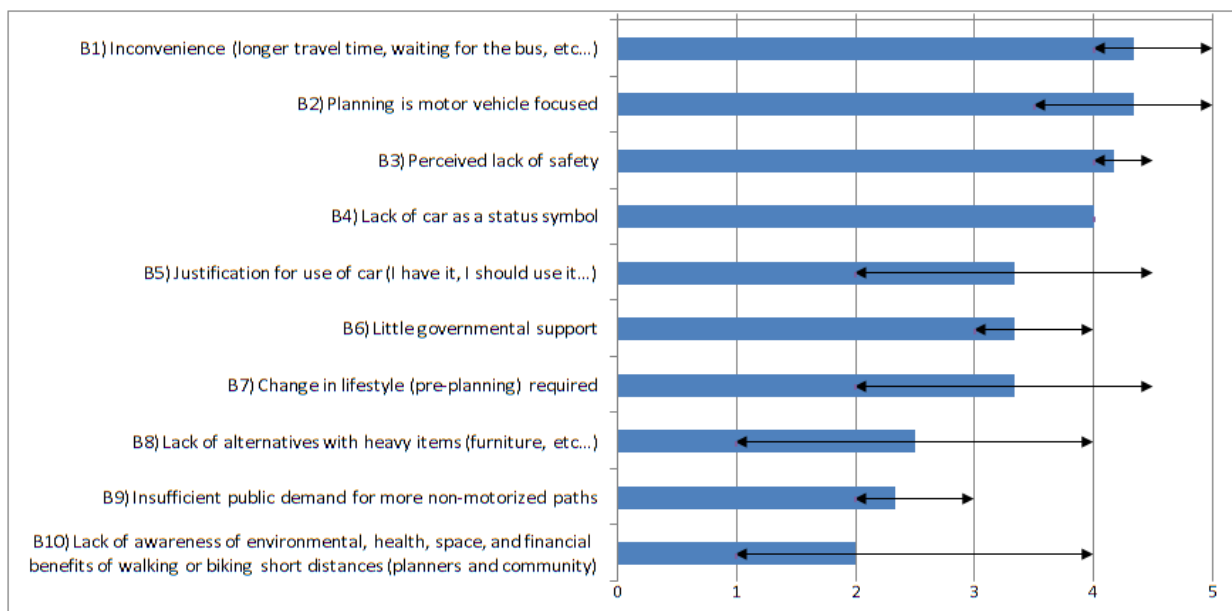
### Individual-Psychological Barriers

- **People have gotten out of the habit of walking**

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 seem to be no longer accustomed to walking as a form of transportation, and as of yet, do not seem willing to accept the inconvenience of longer travel times. And, for regular car users, the social status associated with cars is still important.

## **ii. Rating and Summary of the Barriers**

For short distance mobility, where we looked at the barriers to reducing car use through walking, biking, or taking public transport for short distance trips, interviewees agreed that the main structural barrier is the focus on motor vehicles in city planning (B2), and the longer travel time required without the use of a car (B1). The latter can be attributed to the former, since readily available parking in the city makes driving a more viable and convenient option to walking or biking, for example. Similarly to the barriers in public transport, individual barriers in B3 and B5 were second most important in the ratings after physical and structural barriers. The cultural barrier of cars as a status symbol was also rated as being somewhat important as seen in B4. Informational barriers do not seem to be as big of a problem (B10) as interviewees deemed that people are sufficiently aware of the environmental and health benefits of not driving, but either not encouraged enough (through city planning) or willing enough to change their behaviors.



### 3.2.2. Relevant Stakeholders

- **City Planners:** There is a need for planners to create more walkable, safer cities.
- **NGOs:** NGOs hold the responsibility for continued education and awareness campaigns.

- **Politicians:** Mayors, for example, have a great opportunity to make change because they are responsible for education in cantonal schools.

### 3.2.3. Past Attempts to Overcome the Barriers

#### Overcoming Physical and Structural Barriers

- **Improving city planning to encourage less car use or at least no growth of car use**

Some 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.

### 3.2.4. Possibilities for Future Action

#### Overcoming Physical and Structural Barriers

- **Integration of the goal of less car use into city planning**

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.

#### Overcoming Individual-Psychological Barriers

- **Increased education and public awareness efforts**

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.

### 3.2.5. Windows of Opportunity

- **Starting a family**

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.

- **Situations where habits are broken**

Any situations where habits are broken, for example, injuries, losing one's driver's license, and other situations make old behaviors not possible anymore, opening opportunities for individuals to experience transport differently from their old habits.

## 3.3. Car-sharing(Use)

We interviewed three stakeholders about barriers to car-sharing: one political authority and two from business.

### 3.3.1. Barriers

#### i. Overview of each Barrier

Stakeholders from the political sphere as well as the car-sharing business were contributors to the barriers presented here. While both 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 thought it was very important, while the stakeholder in the car-sharing business thought awareness was not one of the most important barriers.

##### Physical and Structural Barriers

- **Ease of access not developed enough for car-sharing**

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

- **Insufficient awareness of car-sharing concept**

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-Normative Barriers

- **Car-sharing seems less "democratic"**

People have an idea of a democratic right to access (through cars generally) to consumer goods, commuting, etc. Denying people this "right" to their car would be like denying "democracy."

##### Individual-Psychological Barriers

- **Car ownership is emotional, not just functional**

People have emotions linked to car ownership that is linked to advertising. This can also be linked to the lack of familiarity with the idea of car-sharing.

##### Economic Barriers

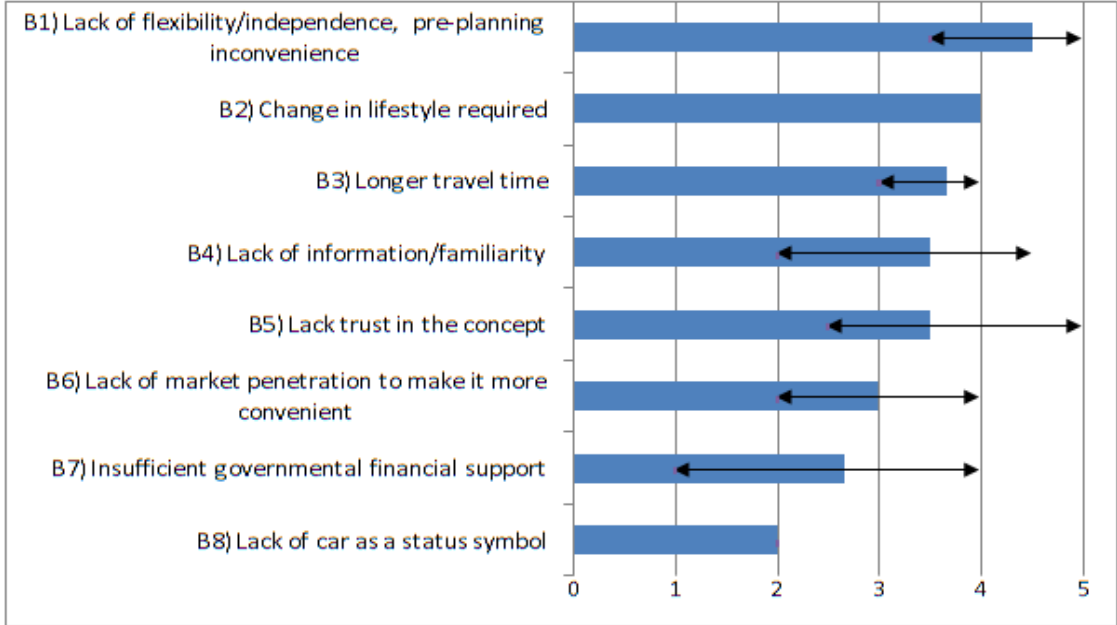
- **Costs of car-sharing seem higher than car-ownership**

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**.

#### ii. Rating and Summary of the Barriers

Car-sharing shared some of the same barriers seen in public transport and short distance, but some rather important barriers were specific to this new concept. The most important barrier rated by interviewees was individual-psychological the lack of flexibility and pre-planning inconvenience (B1) that car-sharing entails for people accustomed to car ownership which seems much more convenience since it is parked just in front of one's house, ready to be driven at any moment. Again, similar to public transport, the change from individual car use and ownership requires a change in lifestyle (B2) that poses a large barrier to many potential car-sharers. Physical barriers of insufficient market penetration (B6) and longer travel time (B3) are related barriers that interviewees saw as relatively important. Also important were information barriers related to familiarity and trust with the concept (B4 and B5). One

interviewee from the car-sharing industry saw this as a major barrier, while another interviewee in the same field saw it as only a barrier of medium importance, similar to the interviewee from the political sector. There was a large range of opinions on the importance of financial support from the government (B8), where interviewees from the car-sharing industry rated it as more important than the interviewee from the government sector.



### 3.3.2. Relevant Stakeholders

- **Service provider companies:** (i.e. cell phone service providers) These companies are responsible for helping improve accessibility to car sharing (i.e. there is a possibility to reserve and open cars with cell phones).
- **Car manufactures and car rental agencies:** These companies need to move into the age of access and move towards the optimization of use of their cars as services, rather than focusing on the cars as a final product.
- **Car-sharing companies:** Companies such as Mobility in Switzerland have the main role to play in promoting their services.
- **Politicians:** 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.

### 3.3.3. Past Attempts to Overcome the Barriers

#### Overcoming Individual Psychological Barriers

- **Advertising**

Neither stakeholder interviewed mentioned any major past attempts that have been made to overcome the barriers, other than the obvious: Car-sharing companies themselves attempting to improve their business and visibility.

#### Overcoming Physical and Structural Barriers

- **Increasing locations of available cars**

Car-sharing companies have also attempted to make access to their cars more convenient and easier by adding additional locations so that people can get to a car-sharing car even outside of city centers.

### 3.3.4. Possibilities for Future Action

#### Overcoming Physical and Structural Barriers

- **Improving access to make the service even more convenient**

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 [eg. 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 sharing initiative is “Autolib” in Paris (same idea as VeloLib).] Car manufactures and car rental agencies need to move into the age of access and move towards the optimization of use of their cars as services, rather than focusing on the cars as a final product. The system must become more service oriented (ie Google meets needs of new age... cars also need to meet the needs of the new age of access to mobility). must be made easier so that access for the general public is as easy as having a car in the driveway, ready to be driven away.

#### Overcoming Information and Individual-Psychological Barriers

- **Continued efforts to improve familiarity with car-sharing concept**

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.

## 3.4. Hybrids (Purchase)

We interviewed two stakeholders about barriers to the purchase of hybrid vehicles, both from the business sector.

### 3.4.1. Barriers

#### **i. Overview of each barrier**

Interviews about increased purchase of hybrid cars were carried out with two stakeholders in the automotive business sector.

#### Economic Barrier

- **High Investment Costs**

Put simply, hybrid cars are still too expensive, compared to their non-hybrid counterparts.

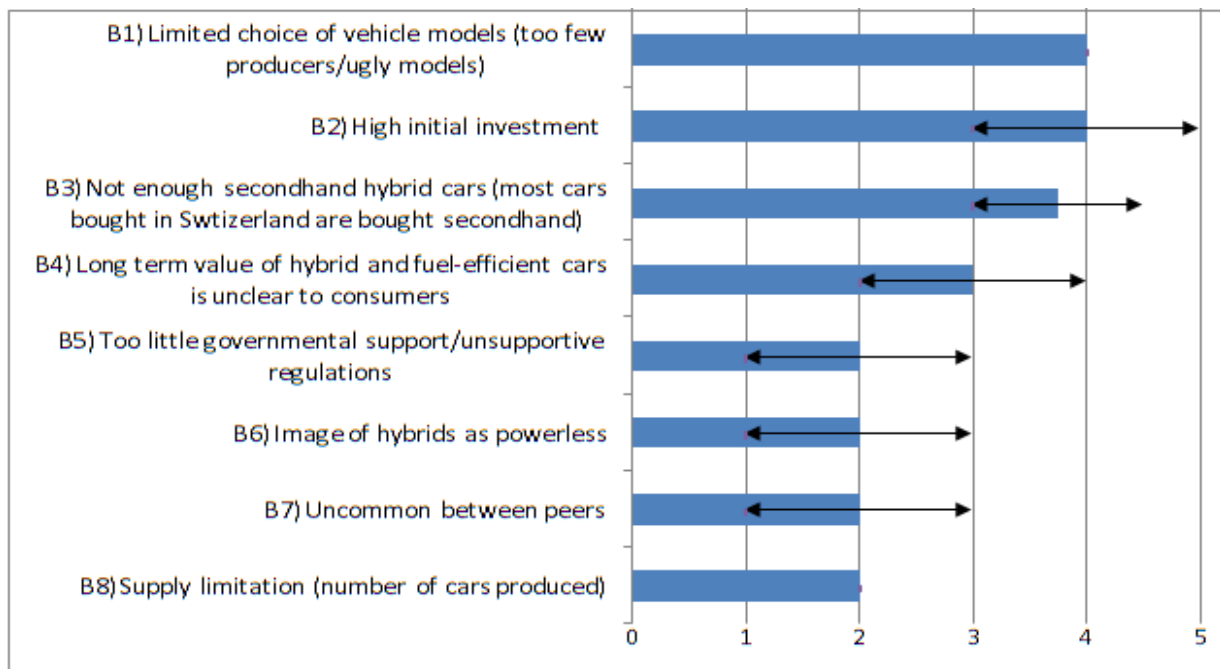
#### Physical and Structural Barriers

- **Little variety in the market**

There is **too** little variety in the models of the cars, since there are currently only three brands that manufacture hybrid cars.

## ii. Rating and Summary of the Barriers

The barriers to the purchase of hybrid vehicles were unique because of the market. The most important barriers as seen by the interviewees were economic barrier of the high costs of these cars (B2) and the physical barrier of the limited choice of vehicle models (B1). Related to the limited supply of these cars (B1 and B8), interviewees also believed that the lack of a good number of used cars makes these cars even more inaccessible financially for a large number of people since most people buy secondhand cars in Switzerland (B3). Less important, but still somewhat significant is the informational barriers associated with hybrid cars (B4); according to interviewees, people are not sufficiently aware of the long term value of hybrids, which makes the high initial cost an even larger barrier. Individual psychological barriers (B6 and B7) and political barriers (B5) seem to be less relevant for hybrid car purchase.



### 3.4.2. Relevant Stakeholders

- **Advertisers:** Advertisers in the automotive industries can help garner more attention for hybrid vehicles.
- **Government:** The government can provide incentives to encourage the purchase of hybrids.

### 3.4.3. Past Attempts to Overcome the Barriers

One interviewee mentioned Toyota's attempt to improve the image of the Prius after the first release was not seen as a very good looking car. The other interviewee simply stated that there is not enough experience with hybrid cars in general to have any major attempts to overcome the barriers as of yet.

### 3.4.4. Possibilities for Future Action

#### Overcoming Economic Barriers

- **Monetary incentives for the purchase of hybrid cars**

Possibilities to overcome the barriers for purchase of hybrid vehicles: incentive systems, such as tax breaks for the purchase of a hybrid vehicle is one way governments can help encourage the purchase of hybrids. However, he also warned that tax relief may also bring inequity. A question to provide an example of the difficulty of determining incentives: "How much does someone get for buying a bicycle instead of a car?" One stakeholder also noted that subsidizing hybrid technology is not a practical way to go, because that brings up a question of having to aid many other technologies as well.

#### Overcoming Informational Barriers

- **Increased advertising for hybrid cars**

Another possibility to improve the problems is **advertising**. Advertising can play a part in getting hybrids more attention.

### 3.5. Fuel Efficient Vehicles (Purchase)

We interviewed four stakeholders about barriers to the purchase of fuel efficient cars: two political authorities, one representative from business, and one NGO.

#### 3.5.1. Barriers

##### **i. Overview of each barrier**

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

- **Insufficient governmental regulation**

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

- **Higher profit margin for larger cars**

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.

- **Inefficient cars are affordable**

And, buying inefficient cars is relatively inexpensive, especially since 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 one stakeholder, the main thing that influences whether one purchases a large car or not is a question of finances.

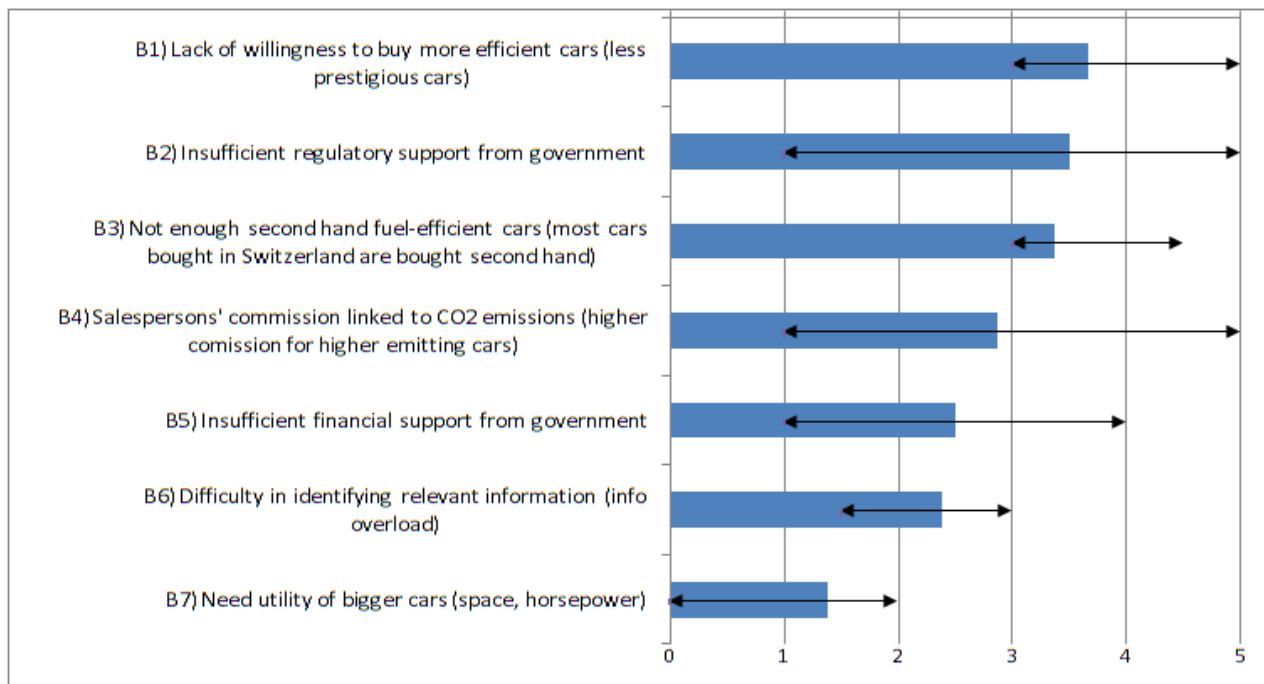
#### Information Barriers or Individual Psychological Barriers

- **Low priority of fuel efficiency for car buyers**

Fuel efficiency is not a top priority for car buyers. Horsepower, brand, and other factors were found to be more important in a survey conducted by a stakeholder in Swiss Government. Perhaps this is due to advertising promoting inefficient cars, or the fact that people are prepared to pay more for a car that reflects status, and generally purchasing an energy efficient car is not a common way to show off in the current culture of society. People would rather save money in other areas (than on fuel efficiency/gas prices). However, this barrier is becoming less important, as efficient cars are becoming "cooler" looking.

## ii. Rating and Summary of the Barriers

Barriers to purchase of fuel efficient vehicles were also unique, and the most important barrier rated by interviewees was a political barrier. While the stakeholders from and NGO and the political sector both agreed that the government needs to step up with more regulations and that the current regulations are insufficient (B2) and pose a great barrier to the purchase of these cars, the stakeholder from business saw the little governmental regulation as a relatively insignificant barrier. There was more consensus on the relatively high importance of the individual-psychological barrier that people are simply not willing to buy more efficient cars (B1), whether that be because they are less prestigious cars or something else. Similar to hybrids, because there are still many people that buy new cars that are not efficient (perhaps because efficiency is less of an economic necessity for people who can afford to buy new cars), people buying secondhand cars are stuck with the former purchases of new car buyers (B3). There was again a great deal of variation on the importance of salesperson's commissions being linked to emissions (higher emitting cars are many times larger, or luxury cars which have a higher price tag) (B4); the stakeholder in business did not view this issue as an important or relevant barrier at all, whereas the stakeholders in government and the NGO found it could be barrier of medium to high importance. Information barriers (B6) seemed to be of relatively little importance compared to other issues.



### 3.5.2. Relevant Stakeholders

- **Auto-schweiz and Touring Club Schweiz:** Both of these organizations could be involved in improving the information platform about efficient cars. Auto-schweiz currently offers information on a website showing people how they can be energy efficient in transportation.
- **Federal government:** The federal government can be involved in efforts to improve awareness and information available about efficiency.
- **Media:** Media can also play a role in providing information about fuel-efficiency of cars.
- **Manufacturers:** Promotion and production of fuel efficient cars falls under the responsibility of car manufacturers themselves.

### 3.5.3. 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.

#### Overcoming Economic Barriers

- **Incentive systems**

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, 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. Critical stakeholders say 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.

One 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.

#### Overcoming Information Barriers

- **Energy Efficiency Labels**

In terms of better information for consumers regarding energy efficiency of cars, two attempts were mentioned. Some stakeholders 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 CO2 relative to weight, making some heavy cars look comparable to lighter, more efficient cars. This can be confusing for customers. Other stakeholders say that energy labels in general will not create a true reduction in consumption, and that other measures should be utilized.

- **Auto-Umweltliste: Ratings for efficient and environmentally-friendly cars**

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.

#### Overcoming Political Barriers

- **Initiative to ban SUVs**

Recently in Switzerland (February 2007), the Swiss Young Greens launched a Federal Popular Initiative to ban SUVs. With Switzerland's direct democracy, citizens can freely form an association and propose a modification of the Swiss Federal Constitution. If the association is able to collect 100,000 valid signatures (verified and validated by local authorities), the Swiss population then votes on the initiative. If accepted by the voters, the government must change the legislation accordingly. Though a ban can be the most efficient way to make drastic changes, the problem one stakeholder saw is that some see it as an attack on privacy and democratic ideals. However, another stakeholder directly involved with the initiative sees it as an opportunity to begin a discussion, rather than as a doomed initiative.

### 3.5.4. Possibilities for Future Action

Three key areas were identified as possibilities for action to reduce the barriers to purchase of fuel efficient vehicles.

#### Overcoming Information Barriers

- **Improve information platforms regarding efficient vehicles**

The first area for improvement would be in informing consumers. From the point of view of both stakeholders from the NGO and business sectors, this could have 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 campaign or campaigns. Autoschweiz, 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.

#### Overcoming Economic Barriers

- **Shift to "true pricing"**

Second, the most imperative change in the opinion of stakeholders was a shift to true pricing, or increasing costs (of fuel, cars, etc...) to reflect all costs of driving (infrastructural, environmental, etc...) as a next step. 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 behavioral change.

#### Overcoming Political Barriers

- **Increased governmental regulation**

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 economy regulations at the manufacturer level, and not just in one country because these changes must be larger scale to make a difference. About the bonus-malus system specifically, improvements and clarifications were recommended so that it deals with the purchase of cars based on absolute consumption numbers and rather than relative numbers. The reasoning: policy must be understandable and clearly communicated in order for it to be accepted. If not keeping the bonus-malus system, other stakeholders from the business industry support using similar control measures to influence purchasing behavior of customers. Along the same lines, one stakeholder from the political sector recommended decreasing the cost of fuel-efficient cars as a way of enticing more people to buy them.

### 3.5.5. Windows of Opportunity

- **Moving**

In the area of fuel efficient vehicles, two possible windows of opportunity were mentioned. 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.

- **Buying a car**

Relatedly, **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. By taking advantages of these times, it may be possible to create more demand for fuel-efficient cars by the people with these situations.

## 3.6. Summary of the Area of Mobility

From this discussion, we would like to conclude with an overview of the main drivers for behavioral change. There are lessons to be learned from past experiences with the barriers, projects that can be scaled up, and a great number of changes that can be made to create an environment that is conducive to behavioral change towards sustainability. A concise recapitulation of the main lessons learned from these qualitative stakeholder interviews and the next steps that need to be taken can be organized into levels: changes needed at the institutional level, and changes at the individual level.

#### Institutional Level Barriers

At the institutional level, themes between the different areas were not as apparent as with the changes needed at the individual level. Each area (public transportation, car-sharing, etc.) has specific barriers and possibilities to overcome them.

Specifically in **public transport**, stakeholders emphasized that **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 in remedying 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 behaviors will change accordingly as well.

Hybrid vehicles are simply too expensive, and there need to be **incentive systems** put in place if the nation wants more hybrid cars to be sold.

One of the main solutions to the barriers related to **fuel efficient cars** was 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.

#### Individual Level Barriers

At the individual level, there were overlapping barriers and solutions that spanned across the various focus areas in the project. For example, public transport shared some barriers with car-sharing, and as such, some of the solutions to overcoming these barriers were not specific, but rather, were more broad solutions to moving toward energy-efficient transport. The four main themes of barriers that were seen are illustrated here, followed by two broad solutions that were mentioned by stakeholders as two main ways to move toward more energy efficient transport.

**Personal habit** was one major barrier that was mentioned as very important in all interviews from Public Transport, Short Distance Mobility, and Car Sharing. 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).

In addition to personal habits, there are certain barriers that are associated with **social construction of transport habits**. For many car owners, the social status associated with cars is still important. Also, depending on one's job, driving a car may be necessary for one's position. Moreover, 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, generally through cars, to consumer goods, commuting, etc. Denying people this "right" to their car would be like denying "democracy."

Another area of overlapping barriers was the **higher perceived cost** of transport in public transport and car-sharing. 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. People generally only calculate the cost of the car using gas prices and quickly forget initial investment and maintenance costs.

For public transportation and decreased use of cars for short distance trips, a major barrier at the individual level is that there is still **insufficient awareness of environmental, health, and space arguments** for increasing public transport and walking and biking short distances.

#### Possibilities for Future Actions

**A move toward True Pricing** and various related financial schemes were mentioned as possibilities for future actions to move towards more energy efficient transport practices **in all five 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.

**Improving education and public awareness** is another possibility to move people towards driving less. Some stakeholders felt that the awareness campaigns *are* having some effect on people's ideas of transport, and may have an influence on behaviors 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. Lastly, **individuals** 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.

#### General Windows of Opportunity

Interestingly, situations or windows of opportunity that were discussed by stakeholders were situations where individual's lives change personally, and others 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 if oil prices continue to rise, driving a car will become too expensive. 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 **CO2/Climate Crisis** discussion has gotten people thinking about the environment. Public transport, walking, biking, and car-sharing (or even driving a more efficient car) is generally more environmentally friendly. This discussion has and can bring about more changes. If people are interested in environmentally friendly lifestyles, then manufacturers will need to offer more environmentally friendly cars.

### III. STAKEHOLDER DIALOGUE

In Switzerland there is one major stakeholder dialogue initiative called the Energy Trialogue Switzerland (ETS). The word "trialogue" can be defined as a conversation or discussion in which three groups participate. Thus, the ETS is a relevant and professional trialogue between representatives from three broad groups, namely from science (national and international experts), society (policymakers, government agencies, and NGOs), and business (companies and professional associations).

The main goal of the ETS project is to be a driving force for long-term sustainable energy policies and to develop innovative solutions that aid the international competitiveness of the Swiss economy, thus contributing to securing quality of life. In this case, the term "sustainable energy policies" refers to the efficient handling of energy and the promotion of renewable energy. The point of the ETS is to work out solutions so that Switzerland can get ahead of the curve in this area.

While electricity is the main area of importance, the ETS's strategy also includes coming up with overall objectives and measures related to energy consumption. An ETS workgroup put together a white-paper this year about the technical and economic potential of different sources of energy, especially renewable energy for electricity, heating, and fuel. That paper, which includes several different perspectives, should give the board of directors of the organization the most transparent analysis of the potential of the energy sources possible. The directors will then agree on the best opportunities which the organization can then support. These opportunities will serve as the basis for the 2050 Energy Strategy, which is currently being developed by the ETS. This 2050 Energy Strategy is the vehicle that will be used to concretely implement the ideas and opportunities identified.

There are many different stakeholders who participate in the ETS initiative. The broader group of participants includes selected people from business, science, and society that are connected to the issue of energy in one way or another. Among the participants are: members of government, companies involved in producing or consuming energy, leaders from NGOs, consumer representatives, national and international experts and scientists, and relevant decision makers from the national, cantonal, and communal levels.

The Trialogue includes one large event per year, where not only the members of the organization are invited, but also select decision makers from politics, business, civil society, and science. In 2007 there was the Trialogue I, which was a success based on the response and interest in continuing the dialogue at Trialogue II. This second meeting was originally planned for 2008, but was postponed to 2009. At the Trialogue II in 2009 a further developed version of the energy strategy was presented and discussed. There were approx. 100 participants.

The reasons for participating in the Trialogue may differ from stakeholder to stakeholder, but there is generally a high level of interest in this kind of dialogue from the broader group of participants. Energy is an important topic at the moment and thus many participate because they view this dialogue as important. The role of the participants at the Trialogue is to give their opinions and feedback. The satisfaction with and acceptance of the Trialogue seems to be relatively large, based on the quick and overwhelmingly positive response to the invitations for the second Trialogue.

The first concrete results of the Trialogue should be available at the end of 2009, so it is difficult to gauge how successful it has been just yet. However, while the ultimate goal is to come up with the 2050 Energy Strategy, the entire process itself has already been very beneficial. The time that has been spent discussing and listening to others brings about awareness, which is a stated goal of ETS. There is a willingness to constructively discuss these issues and everyone is interested in common solutions.

Thus far, the ETS has been a success in several ways. One goal was to get all the important stakeholders, from different areas and with different opinions, to the table. This has been achieved. Another goal was for the stakeholders to gain an understanding of the opportunities and to have a clear goal of which direction to go in the future. This area is still a work in progress. There will not be a consensus reached on every detail. But the idea is still to show where there is a broader consensus. Another goal of the initiative is to define measures to take advantage of the identified opportunities and that will be in the energy strategy.

While the Trialogue events and the workshops represent a work in progress, there have also been scientific findings coming out of the ETS. Papers have been published on the ETS website (<http://www.energetrialog.ch>). The ideas for these studies came out of the discussions in the Trialogue.

The idea was never to have the Trialogue continue forever, the process is limited to 3 years. The basic question is how the measures will be implemented. The ETS cannot implement all of the developed measures itself, also politicians and business leaders are important stakeholders. The individual participants recognize during the discussion that it will eventually be wise to team up together. This could be done through industry agreements that are developed by the businesses themselves or by convincing politicians with credible arguments that will be developed in the ETS.

## IV. CONCLUSION

In this report, we analyzed the barriers to change for sustainable energy behaviors. To do this we looked at the purchase and the use phase. In general, problem awareness often exists, however, when it comes to acting, people often have other priorities than energy efficiency or sustainable energy sources. We found that the barriers are quite similar in the three different areas regarding the purchase phase and the use phase.

Regarding the purchase phase, the most important barriers are the economic barriers, which concern mainly the high investment costs, but also the low power price. Looking closer, we find that these barriers are often linked to other aspects/barriers.

Information barriers are important in the field of housing and energy efficient appliances, where the investment costs are often not perceived correctly. Life-cycle costs are rarely cited and sometimes even impossible to calculate, because the energy prices of the future are not known. Also regarding green power, the lack of information is a major barrier. Consumers do not know about the added value of green power, which justifies the slightly higher price. Some do not know that it is even possible to buy green power or they do not know that there are labels. This lack of knowledge leads to individual-psychological barriers such as the lack of trust in green power and the lack of willingness to switch to green power.

Further, the lack of knowledge and will of professionals has been perceived as an important barrier. These include architects (PV, housing), artisans (housing), and salespeople (energy efficient appliances).

Individual-psychological barriers are important when people have to make trade-offs between energy-related high investments (as PV and housing) and other big purchases such as cars or a new kitchen. One way to overcome this barrier is to change the image of these investments: Instead of having a nice car, it could for example be cool to have some solar panels on the roof. especially in regard to high investments. Regarding PV, the high costs are linked to a political barrier, the capped feed-in tariff. With regard to mobility, one major individual-psychological barrier stands out: the low priority of fuel-efficiency in car buyer's purchase criteria. Other factors such as brand and horsepower have more sway currently than efficiency.

In regard to the use phase, the interviewed stakeholders perceived the individual-psychological barriers as the most important. People have habits which would take a lot of effort to change. For most consumers cooking is mainly about good taste, health, and/or speed. Driving as well has become habitual, and people have gotten out of the habit of walking and biking. The low energy prices (economic barrier) provide no incentive to change behavior. Also, information barriers are important. Consumers often do not feel motivated because they think that their behavior will not make any difference and they do not know what they should do concretely. They do not know which behavior has which impact as they only receive the electricity and heating bills once a year. If they would get immediate feedback about their energy consumption, this would motivate them to change their behavior.

In the past, there has been a strong focus on voluntary measures, including the spread of information and the creation of voluntary agreements.

A lot has been done to inform the public. The biggest change regarding energy efficient behavior in the last year has probably been reached in the field of appliances purchase. This regards the decision of each consumers (and not just homeowners), and does not demand any change in behavior. There is still improvement necessary, especially regarding labeling and life-cycle cost declarations.

An area in which a lot can still be done is also marketing. A couple of stakeholders pointed to the fact that, if an investment is cool or popular, people are willing to spend more money on it. So far, practically no marketing has been done for PV. Regarding green power, new innovative marketing approaches are necessary. For appliances, energy efficiency needs to become a buying criteria.

However, the reach of most of these measures is limited. A much more efficient way to overcome these barriers is through obligatory measures. Some first steps in this direction have been taken in recent years. A feed-in tariff (although capped) has been introduced; some regions have a partly green power mix offered by their utilities; the legal regulations in the construction business have been greatly improved, and minimum standards for electric appliances have been defined and more will be introduced in the following years. These measures need to be expanded and increased in the future. Stakeholders are unanimous in the point that bans and cost/price are the most efficient measures.

These different methods are necessary and possible to work both individually and collectively towards more efficient use of energy in domestic use, efficient appliances, and in household mobility. All of this requires a fundamental change in perception or mentality of what is normal and what is important. Besides the structural, economic, political, and informational barriers that stop or slow people from adopting more efficient behaviors and lifestyles, there is the underlying perception created by individuals and the culture of what is acceptable behavior that is a barrier. Ultimately, this will have to change in the coming years if people want to sustain healthy lives on this planet.

One would like to think that this knowledge alone would enable people to break the barrier of habit and laziness that keeps people in their less energy efficient ways of living, thus changes at the individual level would make the system more sustainable. The interviews showed however that at the institutional level (including economic, political, physical and structural levels) are equally important to reach a sustainable energy system and thus need to be addressed simultaneously.

To give an example of this, in addition to raising awareness of the importance of traveling more efficiently and sustainably, there are specific changes in structure that need to be made in the various areas of mobility. True pricing will help make the costs of transport choices more visible, and encourage people to use the more efficient form of transport (where costs reflect energy efficiency). City planning to encourage the use of bicycles, walking and public transport will further encourage people to forgo car use and perhaps even forgo buying a car at all in places where it is more useful to use other forms of transport. From the example of car-sharing, we saw that there needs to be more innovative thought in terms of types of transport. While decreasing the use of cars is a realistic possibility, it is harder to imagine (and likely not even necessary) to discontinue the use of personal cars. If cars were viewed more as a service rather than a product, the possibility for car-sharing becomes a more realistic opportunity to expand the options of transportation to meet the needs of a dynamic population with a vast variety of transportation needs. And last but not least, for the example of mobility, regula-

tion of vehicle fuel efficiency was mentioned as a necessity in order to promote the production and sale of more efficient cars in the industry.

Based on these findings from stakeholder interviews, it would be interesting to build on this and see if consumers share the same view on what is necessary to overcome the barriers to change towards more energy efficient behaviors. This will be the focus of WP 5, doing a quantitative consumer survey.

## ANNEXE

- Interviewees in the Area of Domestic Energy Use
  - Harry Künzle, Energy Commissioner of St. Gallen
  - Andreas Haller, Member of the executive board of Ernst Schweizer AG, responsible for solar energy systems
  - Patrick Hofstetter, Chief of Climate Policy division of WWF Schweiz
  - Andreas Luzzi, Professor, Director of the Institute SPF of HSR Rapperswil
  - Robert Horbaty, Managing Director of the Association for Promoting Wind Energy in Switzerland "Suisse Eole" and of the Association Label Energy City, owner of ENCO Energie-Consulting AG, Program Manager of the P+D Wind Program for the Swiss Federal Office of Energy.
  - Stefan Nowak, NET Nowak Energie & Technologie AG (Physicist, Director of NET Nowak Energie & Technologie AG (Consulting firm in the area of renewable energy specializing in photovoltaics), Director of the Swiss Research Program for Photovoltaics in cooperation with the Federal Office for Energy, various international positions in various networks related to photovoltaics)
  - David Stichelberger, managing director of Swissolar (Switzerland's professional association for solar energy)
  - Giuse Togni, Energy consultant and planner, President of SAFE (Agency for Energy Efficiency), Member of the Board of Directors for "Energie Schweiz" for Municipalities (Energienstadt), personal consultant for municipalities, Member of the Advisory Board for Edisun Power Europe AG.
  - Cornelia Brandes, Dipl. phys. ETH, owner and executive of Brandes energie - Naturmade (green power labeling)
  - Charles Müller, product manager hypothecary credits & building loan
  - Urs Peter Menti, chief of the institute for integral building services engineering and chief of certificate authority for Minergie-P
  - Benno Zurfluh, co-owner of HLK- engineer bureau ZURFLUH
  
- Interviewees in the Area of Household Appliances
  - Jürg Berner, executive of product management Electrolux Schweiz
  - Rudolf Bolliger, president of energy agency for electric appliances (eae) and executive of industrial union for electric appliances (FEA)
  - Fabian von Selve, Product Manager of Kuhn Rikon Switzerland, a well-known producer of high quality Swiss pans.
  - Jürg Nipkow, Dipl. electrical engineer ETH/SIA, chief of ARENA (Association for Energy Alternatives), and member of the board of S.A.F.E. (Swiss agency for efficient energy use).
  
- Interviewees in the Area of Mobility
  - Peter de Haan van der Weg, Institute for Environmental Decisions ETH

- Benedicta Aregger, Department of the Environment, Transport, Energy and Communications (UVEK)
- Aline Trede, Vice President of Green Party of Switzerland
- Gery Balmer, Bundesamt für Verkehr (Swiss Federal Office of Transport)
- Felix Reutimann, Federal Office for the Environment (Bundesamt für Umwelt)
- Michael Rytz, VCS (Verkehrs-Club der Schweiz)- responsible for traffic safety projects.
- Peter Mulheim- Manager of Mobility Support AG
- Conrad Wagner- Mobility Systems, co-founder
- Hannes Gautschi- Director Service and Training, Toyota
- Andreas Burgener- Director, Auto-schweiz
- Moritz Christen- Verkehrs-Club der Schweiz, responsible for individual motorized transport issues.