

Energy research in the 7th framework programme

# BarEnergy

Barriers to changes in energy behaviour among  
end consumers and households

## Final report Annex

Integration of Three Empirical Studies

*Edited by Sophie Emmert, Martin van de Lindt and Helma Luiten*





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# Contents

<b>1</b>	<b>Annex I:</b> <b>Examples of measures for energy saving</b>	<b>7</b>
	1.1 Heating behaviour	7
	1.2 Household Appliances	13
	1.3 Transportation	17
<b>2</b>	<b>Annex II:</b> <b>Policy recommendations on Energy Saving</b>	<b>29</b>
<b>3</b>	<b>Annex III:</b> <b>Examples of measures in energy efficiency</b>	<b>37</b>
<b>4</b>	<b>Annex IV:</b> <b>Policy recommendations on Energy efficient Purchase</b>	<b>48</b>
<b>5</b>	<b>Annex V:</b> <b>Examples of measures for changing to sustainable energy sources</b>	<b>55</b>
	3.1 Domestic Energy Use	55
	3.2 Transportation	58
<b>6</b>	<b>Annex VI:</b> <b>Policy recommendations for changing to Sustainable Energy Sources</b>	<b>60</b>
<b>7</b>	<b>Annex VII:</b> <b>References</b>	<b>65</b>



## Annex

# Examples of measures for energy saving

This section of the Annex presents a wide range of potential measures that have, or could be, adopted to encourage energy saving behaviour. These do not represent recommendations, as such, but aim to give a comprehensive overview of tools and initiatives suggested by stakeholders and consumers in the empirical research.

## 1.1

## Heating behaviour

Barrier categories	Examples
<b>Individual/ psychological barriers</b>	<ul style="list-style-type: none"> <li>• Comfort is a priority</li> <li>• Habits are hard to change – energy saving requires effort</li> <li>• Habits of switching off and turning down are not well established</li> <li>• Lack of belief in individual effort making a difference</li> </ul>
<b>Cultural normative and social barriers</b>	<ul style="list-style-type: none"> <li>• Responsibility for environment is considered secondary to personal gain/ spending</li> <li>• Tendency to maintain high indoor temperatures</li> </ul>
<b>Knowledge based barriers</b>	<ul style="list-style-type: none"> <li>• Lack of knowledge regarding heating technology</li> <li>• Lack of knowledge regarding efficient ventilation and healthy indoor temperatures</li> <li>• Lack of specific information - information is too generic</li> </ul>
<b>Economic barriers</b>	<ul style="list-style-type: none"> <li>• Energy is too cheap for many to change behaviour</li> <li>• Construction developments focus on cheapest solutions – energy saving responsibility left to consumers</li> </ul>
<b>Physical and structural barriers</b>	<ul style="list-style-type: none"> <li>• Lack of direct feedback on levels of energy consumption or saving – meters/bills</li> <li>• No possibility to regulate heating levels locally</li> </ul>
<b>Political barriers</b>	<ul style="list-style-type: none"> <li>• Difficulty in coordinating multiple initiatives</li> </ul>

## Physical and structural barriers – strategies and tools

<b>Physical and structural barriers</b>	<ul style="list-style-type: none"> <li>• Lack of direct feedback on levels of energy consumption or saving through metering and/or bills</li> <li>• No possibility to regulate heating levels locally, or to use timers to regulate heating</li> </ul>
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### Smart metering – Technical innovation

Smart metering systems for electricity, heating and cooling can provide real-time and historical data on energy consumption and tariff details. This was suggested by consumers in both CH and the UK.

Ensuring that every home has a smart meter with real time displays would also be an important step to overcome other barriers where information and motivation is closely linked, e.g. psychological or knowledge barriers. Installing such a measure could engage consumers, help to understand consumption behaviour, and lead to more sustainable consumption patterns. Visual displays of energy use data draws the attention of consumers to their energy consumption, and makes it possible for more people to be more efficient with their energy use. Without such direct consumption feedback, energy consumption levels remain largely invisible for the majority of households. Additionally, consumption feedback devices would make it possible for consumers to compare and evaluate their own consumption patterns relative to an "appropriate" level of energy consumption and monitor both cost and energy savings achieved by adapting different practices in the household.

Smart metering could be deployed through local authorities or governmental energy saving entities in cooperation with the energy distributors.

### Easy to use energy saving technology – Technical Innovation

The further development and installation of temperature regulation systems for electrically heated apartments should be a priority. Ideally these would be easily programmable, user-friendly systems that can reduce temperatures at night and during unoccupied periods of the daytime. Here experience from the Warm Front programme (UK) is useful. This programme provides grants for heating and controls to low income households. Although the technology provides the means for home heating behavioural change (i.e. controls), focus group participants criticised the limited guidance given to householders - installers lack the time and skills to adequately explain the new technology. Such concerns were also echoed by consumers in focus groups in NO. Without adequate instruction, it is unlikely that the optimal energy savings from these installations will be achieved. The challenge for manufactures, therefore, is to ensure that energy saving technologies are as user friendly as possible.

## Political barriers - strategies and tools

<b>Political barriers</b>	<ul style="list-style-type: none"> <li>• Coordination of multiple initiatives</li> </ul>
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### Better coordination and prioritizing energy and environmental issues – Change in infrastructure (institutional)

In several countries of study, stakeholders and consumers alike mentioned a variety of government interventions that could speed up the installation of energy saving measures. These included higher taxation, better supporting incentives and zero

interest loans. However, coordinating multiple initiatives in the environmental and energy field was seen as the major challenge that needs to be met.

The general feeling here was that measures (and strategies and/or programmes to implement them) need to be prioritised by their energy saving potential. At the moment, the impression was that all measures are given equal support irrespective of their performance or ability to reduce energy consumption. It was felt that political focus to make this happen was lacking, but that it was very important to ensure that efforts were made to coordinate the expertise and competence that exists in the different energy saving sectors.

The one exception was HU, where support of energy efficiency programmes appears to be limited.

Stakeholders would include all bodies involved in energy saving implementation and policy development. Co-ordination could occur under the umbrella of national governmental task forces.

## Knowledge based barriers - strategies and tools

### Knowledge based barriers

- Lack of specific information - information was just too generic
- Lack of knowledge regarding heating technology
- Lack of knowledge regarding efficient airing and healthy indoor temperatures

### Offer face-to-face advice – Consumer Information

In theory, better energy-educated consumers will be able to make greater reductions in their energy consumption. One common suggestion from the focus groups was that a variety of reliable information already exists and those interested enough will always seek it out. However, there were also concerns that those with less understanding of energy use did not access this information and would benefit from it being more widely available.

Furthermore it was felt that a lot of information is very generic and not easily transferable to specific consumer needs. It was suggested that in-depth face to face advice, such as “Energy Experts” visiting consumers in their own home, needs to be delivered in far higher volumes to stimulate improved heating behaviours. According to some:

“If someone could come to your home, look at your house, and then suggest improvements/actions, that would be great. Because then it would be customised to your specific needs, instead of looking at an internet site and reading about how you could change your windows. Yeah, but do I need that? It would be better with an expert taking a look and saying: ‘these windows are very old, you could save a lot by changing them.’” (NO)

Energy performance audits were discussed in focus groups in CH. It was suggested that more people could conduct an energy performance audit for their buildings in order to find out where energy is lost/wasted and where improvements would be most effective. The possibility of doing such an audit should be communicated to the general public more broadly, and this could also be sponsored and done in cooperation with local municipalities.

### **More specific advice on daily actions - Consumer Information**

Related to the need for more face-to-face advice is the need for more specific advice on daily actions people can take to save energy. For example, in FR the impression was that most consumers were only aware of a few energy saving actions they could do and that there was now a need for information campaigns on a broader scale, listing up new and more specific advice on daily actions to save energy. For instance, only one person spoke of "closing the shutters", and no participants mentioned acts related to cooking, cleaning or DIY. These activities have not been the subject of education campaigns in France, and so are not closed linked to energy saving behaviour.

### **Energy awareness and competence centres - Consumer Information**

Setting up "Energy Info-rooms", or competence centres to provide reliable information about alternative solutions was seen as potentially useful by stakeholders in FR and HU.

Awareness raising campaigns would be beneficial, but the main concern is that much of the available information is too generic. Energy Saving Trust Advice Centres in the UK have suggested that in the future they should provide more in-depth face-to-face advice to households on property specific solutions, suitable installers and relevant sources of funding. The consumer should also be re-contacted in the future to help ensure they overcome any barriers encountered.

### **Making individual costs more visible - Consumer Information**

It is important to relate energy use to consumer bills. Making consumers more aware of the costs of using energy and possible actions they can do to save money on their bills could have a big impact on energy savings:

*'Seeing the energy bill made my son change his energy habits; as a student, he did not pay for the energy bill himself, but now that he lives in his own home, he's suddenly turning off the lights whenever he can, turning down the thermostat... Having to pay for his electricity and gas himself has really changed the way he uses energy' (NL)*

An option could be to connect home heating systems to the Internet. This would make it possible for usage statistics, savings of both energy and money to be viewed online, with the transparency of information empowering the consumer to take more responsibility. For example, getting to know your own "Energy footprint" can be a means of helping people understand the impact of individual actions.

In CH the incentive to reduce one's own energy consumption could be helped by providing individual heating bills as standard. Here, bills are not always specific to each tenant. Separate contracts often have greater administrative burdens and so households and energy suppliers are not eager to change.

### **Role-models to inspire and motivate - Consumer Information**

Using celebrities and opinion leaders on television and other media outlets could be an important way of raising awareness. Focus group discussions mentioned how NGOs especially are seen to hold to extreme positions and thus lack credibility in some consumer groups. Large corporate brands could also be an ideal candidate to promote energy saving.

### **Lack of knowledge about airing/indoor temperatures - Consumer Information**

Information campaigns to reduce high indoor temperatures and improve inefficient airing practices amongst consumers could have significant success if they focus on economic benefits. However, achieving infrastructural improvements on dwellings, primarily new buildings, represent a more urgent challenge: construction companies

often focus on the most economically profitable solutions.

A technical solution to inefficient airing behaviour has been developed by Minergie-P Homes in CH. They have installed windows that either completely open or remain closed. This ensures that short periods of good airing occur, and that over ventilation from windows left partially open for long periods of time does not occur.

#### Relevant stakeholders

For all the above mentioned initiatives to improve consumer information levels, relevant stakeholders would be national energy advisory/environmental organisations, in cooperation with energy suppliers, NGO's and local authorities.

## Economic based barriers - strategies and tools

#### Economic barriers

- Energy is too cheap for many to change behaviour
- Construction plans for cheapest solutions – leaving energy saving responsibility with the consumers

#### Taxation and regulation – Economic and Legal instruments

Low price levels for domestic energy fuels were seen as a primary barrier against savings in most of the countries of study. Regulatory measures like higher taxation levels were frequently discussed, usually with consumers initially taking up a negative stance towards such measures. However, many also openly admitted that such “push measures” like regulation and taxation might produce the best results. There were also suggestions that resistance towards regulatory measures was often short-lived, and that consumers would accept reasonable changes and regulatory measures after initial resistance towards such restrictions. Interestingly, possible reductions in taxation levels as a reward for energy saving actions/investments were not mentioned that often, as the discourse was primarily focused on the restrictive nature of regulatory measures. (FR)

Consumers also expressed concern that such strategies carry a significant political cost, which was why a cynical viewpoint was often taken and used as an explanation for lack of political action when it came to regulation/taxation as an instrument.

One concrete strategy that has been adopted on local levels is paying for hot water use on a volume basis (e.g. per litre used). The stakeholders to be involved in such a strategy could be local municipalities or national homeowner organisations. A home owner from NO described their experience:

“I lived in a Homeowner Association in Oslo, and they installed a meter, so that you had to pay per litre (hot water) used. There was clear resistance towards this measure when it was initiated. However, the consumption went down dramatically; and we got a lot of money back at the end of the year. ”

Another regulatory economic instrument that was implemented in NO in the past was increasing the price of electricity during peak demand. In order to implement this today, the stakeholders would have to be the local energy suppliers in cooperation with national governments.

#### Interest free loans – Economic tools

Interest-free government loans to support refurbishments/investments towards energy saving measures was suggested by both stakeholders and consumers (FR &

NO). This instrument could be considered along with current grants covering a minor parts of refurbishment and/or investment costs of energy saving measures. Relevant stakeholders for this instrument would be national energy saving organisations, with governmental support.

#### **Addressing the focus on cheap construction – Economic tools (plus Legal instruments)**

The lack of innovation in the construction business was highlighted by one Norwegian stakeholder as a barrier to implementing energy saving technology. It was also stressed that the main motivation of construction companies is to build as cheap as possible, disregarding the user phase which follows, thereby leaving the responsibility to act within the framework and using the installed technology solely at the consumers feet.

Some stakeholders identified that the life span of a dwelling should be considered when calculating the energy savings from installing efficiency measures during the construction phase. Incentives that contribute to construction firms choosing more energy efficient solutions when designing and constructing new buildings would thus have the potential for long lasting energy saving effects.

#### **Energy labels for houses – Consumer Information/Legal instruments**

An energy label or energy performance certification system for buildings being sold/ bought/rented is already in use in some of the countries, and is being introduced shortly in others.<sup>1</sup>

Stakeholders here are national governments/national energy saving entities.

## **Individual/psychological barriers - strategies and tools**

<b>Individual/psychological barriers</b>	<ul style="list-style-type: none"> <li>• Comfort is a priority</li> <li>• Habits are hard to change – energy saving demands effort</li> <li>• Habits of switching off and turning down are not well established</li> <li>• Lack of belief in individual effort making a difference</li> </ul>
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#### **Government as role models – Consumer Information**

Governments need to be aware of their part as role models for the general public. Individuals in the focus groups often criticized the practice of leaving lights on in massive public buildings where it was perceived as a huge waste of energy, undermining consumers' motivations. By acting as role model, for example by switching off all appliances and lights at a university at night, or reducing the lights on major shopping streets at night, consumers would see public institutions as being more credible and individual efforts would be seen as "making a difference". (CH and NO)

Stakeholders are public companies and national governmental entities from all sectors.

1) The energy certificates for buildings in the UK contain: a) information on a home's current energy use and carbon dioxide emissions. b) an estimate of how energy efficient a home could be if you put in place energy saving measures, like fitting loft insulation. c) a report with suggested ways to reduce energy use and carbon dioxide emissions. ([www.direct.gov.uk](http://www.direct.gov.uk))

## Cultural normative and social barriers - strategies and tools

### Cultural normative and social barriers

- The responsibility for environment is considered secondary to personal gain/spending
- Habit of high indoor temperatures

### Motivation by monetary means – Consumer Information

Government information campaigns are well known instruments. But the widespread consumer focus on monetary savings as a motivator indicates that there might be more potential energy savings and efficiency in stressing the cost saving benefits of energy saving measures than those typical messages which stress the environmental consequences of energy use. (NL, NO, UK)

A shift in motivational campaigns along these lines would have to be aligned with other instruments like an individual billing procedure for the domestic energy costs to ensure transparency of the rewards for their efforts to save energy.

Relevant stakeholders would be national energy advisory entities and NGO's.

### Energy Saving Calculators – Consumer Information

One way of benefiting from the fact that saving money is a primary motivator for consumers is to offer more specific feedback on different actions/investments and the potential savings related to these. The creation of an internet site based "Energy Saving Calculator", which could be customised by the consumers themselves to suit different kinds of dwellings, could be one such instrument.

The suitable stakeholder to act as the credible and natural presenter of such a calculator could be national energy advisory organisations.

## 1.2

### Household Appliances

This topic was unfortunately only covered in the focus groups of some countries, due to time constraints in the interviews/groups. Only CH, FR and HU covered this topic in full in stakeholder interviews and focus groups.

### 1.2.1

#### Cooking and Baking

Barrier categories	Examples
Individual/psychological barriers	<ul style="list-style-type: none"> <li>• Lack of consumer will to save energy</li> <li>• Energy saving is behind taste, preparation time and health when cooking</li> </ul>
Knowledge based barriers	<ul style="list-style-type: none"> <li>• Lack of knowledge of possibilities as individuals to influence energy consumption</li> <li>• Lack of feedback on alternative cooking and baking practices in terms of energy saving</li> </ul>
Physical and structural barriers	<ul style="list-style-type: none"> <li>• No opportunities to receive concrete feedback on energy consumption from appliances used for cooking and baking</li> </ul>

<b>Economic barriers</b>	<ul style="list-style-type: none"> <li>• Energy prices are too low for many consumers to consider changing their behaviour</li> </ul>
<b>Cultural normative and social barriers</b>	<ul style="list-style-type: none"> <li>• Cooking and baking has strong cultural ties and is deeply habitual</li> </ul>

## Physical and structural barriers – strategies and tools

<b>Physical and structural barriers</b>	<ul style="list-style-type: none"> <li>• No opportunities to receive concrete feedback on energy consumption from appliances used for cooking and baking</li> </ul>
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### Cooking practices and energy consumption – Consumer Information

Measures need to be implemented to help people evaluate the energy consumption linked to different cooking and baking practices. However, providing information about the consumption which lets them make informed decisions is one thing, but providing new technology which displays energy consumption levels explicitly is another. Any measure must emphasise and visualise the difference in energy savings/consumption (FR).

Such a responsibility would fall upon the manufacturers of household appliances, and one possibility would be for governments to demand/subsidise such technological advances.

Alternatively, providing new technological solutions when it comes to ovens, stoves, pots and pans that make use of energy in more efficient ways is another strategy where manufactures could have a key role to play.

## Knowledge based barriers – strategies and tools

<b>Knowledge based barriers</b>	<ul style="list-style-type: none"> <li>• Lack of knowledge of possibilities as individuals to influence energy consumption</li> <li>• Lack of feedback on alternative cooking and baking practices in terms of energy saving</li> </ul>
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### Labelling for appliances on gas – Consumer Information/Legal Instruments

Energy efficiency labelling could also be considered for appliances running on gas, not just those using electricity.

Relevant stakeholders could be the EU in cooperation with national energy saving initiatives and manufacturers of such appliances.

### Changing habits through information through several channels – Consumer Information

All 3 countries that investigated the topic of cooking and baking in the context of energy saving reported strong habitual patterns linked to cooking, and a clear lack of information about more energy efficient practices. Numerous points of information were identified by stakeholders: manufacturers, salespeople, energy labels on cooking appliances, consumers' NGOs, home economics classes, magazines, packaging etc.

Information in newspapers and magazine recipes is another possible channel

for information about cooking and baking. This could be put next to preparation instructions, where the preparation time, the level of difficulty and the calorie content is usually listed. Energy saving preparation tips could also be placed directly on food packaging; in cookbooks; cooking demonstrations; cooking television shows. Energy efficient cooking suggestions could also be integrated in the use instructions for stoves and pans.

Relevant stakeholders are national energy advisory entities and appliance manufacturers.

#### **Information campaigns by schools – Consumer Information**

Home economics classes and cooking schools could be instructed to emphasize energy efficiency, and students could receive tips and suggestions about how to cook energy efficiently. Since many students might be quite new to cooking and might not have developed rigid habits yet, this could be a very good opportunity to make them aware of their energy use.

Relevant stakeholders are national energy advisory entities and NGO's.

#### **Energy efficient cooking saves time – Consumer Information**

More energy efficient cooking, for instance by using a lid, helps to save the environment by saving energy. It could also save the household a bit of money, but perhaps more importantly in a households' stressful everyday life, it also saves time!

Preparation times are often considered an important factor when deciding what kind of dish to prepare. Future endeavours should look to highlight the financial and time saving aspects of energy efficient cooking, not just the environmental benefits.

Stakeholders could be national energy advisory entities.

### 1.2.2

#### **Use of Appliances**

Barrier categories	Examples
<b>Individual/psychological and Cultural/social barrier</b>	• Personal effort required to completely switch off appliances, and remembering to do so on a regular basis.
<b>Knowledge based barriers</b>	• Lack of knowledge about energy consumption levels of appliances – poor basis for making energy saving decisions.
<b>Physical and structural barriers</b>	• Some appliances require re-programming after being switch off completely
<b>Economic barriers</b>	• Low energy prices.

#### **Knowledge based barriers – strategies and tools**

<b>Knowledge based barriers</b>	• Lack of knowledge about energy consumption levels of appliances – poor basis for making energy saving decisions.
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### Reaching the consumers – Consumer Information

As mentioned previously, there was a lack of knowledge about the energy consumption of appliances in several countries. However, it appears that while the knowledge is often lacking, the information is not: despite plenty of energy saving advice being available only a small number of people attempted to educate themselves.

It was suggested that addressing this issue requires the same approach to reducing heating levels in the home: more practical face to face advice is required, with this advice being targeted at specific individual consumer situations.

Relevant stakeholders here would be national energy advisory/environmental agencies, in cooperation with energy suppliers, NGO's and local authorities.

### Energy saving meters – Consumer Information

Real time display devices have been proclaimed as a useful method for helping consumers understand their energy consumption. In theory, the device can allow people to monitor the energy consumption of individual appliances and relate this consumption to their energy bills. Using this information could help people to adapt their behaviour and reduce energy consumption.

Possible stakeholders could be local municipalities in cooperation with national energy saving agencies.

## Physical and structural barriers – strategies and tools

### Physical and structural barriers

- Some appliances require re-programming after being switch off completely

### Encourage or enforce development of complete switch off appliances – Technical Innovation

Overall, it is considered that switching off electrical appliances instead of leaving them on stand-by saves only a minute amount of energy. However, some consumers in NL and NO explained that concerns over fire safety caused them to completely switch off appliances more than the motivation to avoid wasting energy.

Often, it is seen as a nuisance to completely switch off some consumer electronics, for example it causes the resetting of pre-set channels; manufacturers should be encouraged to produce appliances that do not require re-programming after being switched off completely.

The EU could be a stakeholder fit to push through such a change in cooperation with the manufacturers.

## Individual/Psychological and Cultural/Social barriers – strategies and tools

### Individual/psychological and Cultural/social barrier

- Personal effort required to completely switch off appliances, and remembering to do so on a regular basis.

### Differentiation in taxing of appliances according to levels of energy waste – Legal Instruments

Regulations could be considered in the context of changing consumer behaviour. One suggestion from a focus group discussion in NO was to enforce higher taxation on energy wasting appliances through a graduated system based on energy efficiency. A similar system exists for road vehicles, where the amount of annual tax paid is dependent on engine size, type of fuel, weight of vehicle etc.

Possible stakeholders for such measures would be the EU/National governments.

## 1.3

## Transportation

### 1.3.1

### Driving more efficiently and less fuel consuming

#### Knowledge based barriers – strategies and tools

<b>Knowledge based barriers</b>	<ul style="list-style-type: none"> <li>• Many drivers already think that they drive well and do not realise the potential for improvement.</li> </ul>
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#### Teaching drivers greener and cheaper driving – Consumer Information

The majority of drivers demonstrated a lack of knowledge about how to improve the efficiency of their driving. Stakeholders involved in the field identified their main strategies were to providing information to private and professional drivers, focusing mostly on driving habits, choice of cars and equipment and car maintenance. (NO) The fact that this was a topic rarely mentioned either at focus groups level or in stakeholder interviews across the countries gives a cause for concern. These indicative findings leave an impression that drivers are already quite confident in their driving abilities and/or they are not really aware of the potential benefits environmentally and economically.

One approach to bridge this knowledge gap is through driving schools. Today very few of the schools teach the pupils “eco-driving”. Increasing such efforts may have a potential positive effect on the environment if driving schools gave priority to eco-driving programs. Such programs could easily receive economic support from national political authorities.

### 1.3.2

### Cutting down on short distance driving, using alternative means of transport instead

Barrier categories	Examples
<b>Individual/psychological and Cultural/social barriers</b>	<ul style="list-style-type: none"> <li>• Private cars are convenient to use</li> <li>• Planning trips is mostly focused on motor vehicles</li> <li>• There is a personal attachment to the car and the freedom it renders</li> <li>• Longer travel times without the car</li> </ul>
<b>Knowledge based barriers</b>	<ul style="list-style-type: none"> <li>• Low awareness of benefits of alternative means of transport</li> </ul>
<b>Political barriers</b>	<ul style="list-style-type: none"> <li>• Politicians are reluctant to make unpopular decisions, i.e. regulate private car use</li> <li>• Governmental support is seen as insufficient</li> </ul>
<b>Physical and structural barriers</b>	<ul style="list-style-type: none"> <li>• The lack of P+R facilities to encourage use of public transport for parts of journeys</li> </ul>

## Physical and structural barriers – strategies and tools

### Physical and structural barriers

- The lack of P+R facilities to encourage use of public transport for parts of journeys

### Improve the quality of P+R services – Change in Infrastructure

Several strategies were suggested to increase the attractiveness of park and ride facilities, these include:

- Increasing frequency of shuttle units - Increasing the number of buses or trains that shuttle between the park-and-ride parking lots and the city centres was a suggested strategy based on its success in the NL.
- More up to date and detailed travel information (e.g. departure times of buses/trains) should be made more broadly available and visible to encourage the use of P+R.
- Ensure infrastructural capacity – The capacity of parking and on buses and trains in the rush hours must be sufficient to avoid negative experiences. Free bus lanes on these are also important to ensure consumer motivation and satisfaction compared to the alternative of driving their car.

The natural stakeholders would be the transport companies with the support of local authorities.

### Extending services beyond park-and-ride – park-and-bike – Change in Infrastructure

Initiating park-and-bike services, which is planned in NL, could stimulate more people to leave their cars outside the city centres. Another related initiative is the cheap “city bike service” in Oslo, NO. This service provides cheap bicycles at many points in the city centre, encouraging people to use bikes for short distance transportation in exchange for a very low annual fee.

Local authorities would be the relevant stakeholders and they could provide the local political infrastructure which would be necessary.

### More eco-friendly infrastructure - Change in Infrastructure

As with the P+R services, there are several tools which could support a strategy of providing a more eco-friendly infrastructure to limit short distance driving and encourage alternative means of transport.

- Make streets more bicycle- and pedestrian-friendly with more crossings, better bike-lanes etc.
- Increase the amount of bicycle-only streets in city centres, streets that can only be used by bicycles or pedestrians to increase traffic safety as well as decreasing car circulation.
- Offering more green parking permits for vehicles not solely run on diesel or petrol.
- A more regulatory and extreme measure would be to make short distance traffic more difficult for cars by using roadblocks.

Local authorities with the support of national governments are relevant stakeholders for such initiatives, improved city-planning is imperative in this context.

## Political barriers – strategies and tools

### Political barriers

- Politicians are reluctant to make unpopular decisions, i.e. regulate private car use
- Governmental support is seen as insufficient

### Improved support through city planning – Administrative instruments?

We identified a need for improved city planning to encourage walking and biking for short distance transportation. Several examples are found throughout Europe, for example in Houten, NL. The city transportation network here was developed so that travelling by bike is quicker than travelling by car.

Local authorities/planners are relevant stakeholders in this process, in cooperation with local commercial/shop organisations.

## Individual/psychological and Cultural/Social barriers – strategies and tools

### Individual/psychological and Cultural/social barriers

- Private cars are convenient to use
- Planning trips is mostly focused on motor vehicles
- There is a personal attachment to the car and the freedom it renders
- Longer travel times without the car

### Improve motivation by improving facilities – Change in infrastructure

If cars are chosen due to their convenience, an effort to make sure alternative modes of transport are more comfortable than currently is one possible strategy. Instruments could be to improve public transport travel times or frequency, improve the bicycle paths, make sure there are enough places to store your bike, make pedestrian or bicycle only areas etc.

If city planning is focused on motor vehicles, it comes as no surprise that consumers often admit to their planning also being centred on the private car. Changing the approach to city planning to be less focused on the car could eventually trickle down to create less mental dependency on the private car.

Relevant stakeholders are national governments on cooperation with local authorities.

### Company campaigns for biking and walking – Consumer Information

A stimulation policy for employees at public offices and companies to encourage employees to bike, walk or run to work is another possible instrument. Economic incentives could be given as motivation.

Relevant stakeholders could be public companies, with support of national energy advisory entities.

### Taxation per kilometre – shorter trips mean heavy tax – Legal Instruments

Another suggestion from the research for discouraging car use on short journeys was the implementation of an incremental pricing mechanism, for example a tax per driven kilometre, where the first kilometres are made significantly more expensive. Regulating and enforcing such a system poses significant administrative challenges however.

Stakeholders here would be national governments, although we expect this instrument to be politically controversial.

## Knowledge based barriers – strategies and tools

<b>Knowledge based barriers</b>	• Low awareness of benefits of alternative means of transport
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### Awareness campaigns – Consumer Information

Awareness of alternative means of transport was perceived to be significantly low. To tackle this, one possible option is to increase public education efforts informing people of different possibilities and to show them how to make changes in everyday life situations they can relate to. This could be done both at workplaces, shopping centres, in schools etc. Word-of-mouth can be an important factor influencing consumer choices.

Stakeholders here would be local authorities in cooperation with both shops and public transport companies.

### 1.3.3

### Opting for private cars instead of using public transport

Barrier categories	Examples
<b>Individual/ psychological barriers</b>	<ul style="list-style-type: none"> <li>• Geography – rural areas will always have poorer options for public transport</li> <li>• The lack of P+R facilities to encourage use of public transport for parts of journeys</li> <li>• Low frequency of departures, longer travel times, much planning</li> </ul>
<b>Physical and structural barriers</b>	<ul style="list-style-type: none"> <li>• The convenience of the private car</li> <li>• Lack of flexibility, freedom, frequency and comfort by choosing public transport</li> <li>• Lack of safety and privacy on private transport</li> <li>• Time – using the private car often saves time compared to public transport</li> </ul>
<b>Cultural normative and social barriers</b>	<ul style="list-style-type: none"> <li>• The perception of the car: autonomy, speed, comfort and freedom tie in with important traits of modern lifestyles</li> <li>• Use of public transport is considered low status compared to private car use</li> <li>• Public transport is not considered a natural and realistic alternative to the car</li> </ul>
<b>Economic barriers</b>	<ul style="list-style-type: none"> <li>• A car is a necessity – the fixed costs of car use is not considered when compared with public transport</li> <li>• Relatively low fuel prices</li> </ul>
<b>Political barriers</b>	<ul style="list-style-type: none"> <li>• City planning is often focused around the use of the private car</li> <li>• The lack of investment in public transportation often means a sub-standard service</li> <li>• Lack of government support for a change towards public transport</li> </ul>
<b>Knowledge based barriers</b>	<ul style="list-style-type: none"> <li>• Low knowledge of the total costs of car use, compared to use of public transport</li> </ul>

## Physical and structural barriers – strategies and tools

<b>Physical and structural barriers</b>	<ul style="list-style-type: none"> <li>• Geography – rural areas will always have poorer options for public transport</li> <li>• The lack of P+R facilities to encourage use of public transport for parts of journeys</li> <li>• Low frequency of departures, longer travel times, much planning</li> </ul>
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### Poor infrastructure must be improved – Change in Infrastructure

Current infrastructural limitations were pinpointed by stakeholders some of the suggested improvements included: increase tram/bus/tube lines (number and length) – more bus stops, wider networks, more P+R parking locations and facilities, more dedicated bus lanes, better bus shelters etc.

National governments have an important role to play in encouraging energy saving in transportation. One approach would be to increase investment in public transport, with the aim of increasing quantity and quality of infrastructure, increasing the attractiveness and to attempt a shift in the preference for private car travel.

As pointed out in the UK, there is a role for the UK Government to outline an overall strategy for a more sustainable transport infrastructure in the UK - one which encourages greater diversity of travel. Better infrastructural provision will be required to achieve such an aim, with local governments adopting the role of the lead stakeholder in such a process.

Main stakeholders would most likely be national governments, in cooperation with public transport companies.

## Individual/psychological barriers – strategies and tools

<b>Individual/psychological barriers</b>	<ul style="list-style-type: none"> <li>• The convenience of the private car</li> <li>• Lack of flexibility, freedom, frequency and comfort by choosing public transport</li> <li>• Lack of safety and privacy on private transport</li> <li>• Time – using the private car often saves time compared to public transport</li> </ul>
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### Increasing convenience of public transport – Change in Infrastructure/Economic tools

It was evident from the research that public transport has to compete with the practicality and personal comfort experienced and enjoyed during private vehicle use if it is to increase its appeal. It appears that whilst the environmental argument of choosing public transport exists, it is outranked by the practicality and comfort of the private car. One participant in CH mentioned that public transportation needs to be made easy and convenient to help ease the transition from the private car:

“The use of public transport must simply become more convenient, e.g. for people with strollers who now have to go up and down stairs to alight.”(CH)

The Swiss Federal Rail (SBB) launched advertising campaigns with the slogan "make you comfortable", promoting trains as being more comfortable than driving. Another convenience measure introduced in some countries are 'countdown' information boards showing the time until the next bus/train arrives.

Higher frequency of public transport was clearly an important factor in the decision to use public transport or not, an impacts on its ability to compete with the total travel times by private car.

Stakeholders: Transport companies and national governments together.

#### **Increasing safety – Change in Infrastructure**

In the UK, concerns about safety have started to be addressed by the introduction of CCTV on public transport and stations. Stakeholders here would most likely be transport companies, in cooperation with local law enforcement, or such services could be outsourced to security companies.

Traffic safety considerations for pedestrians and bicyclists should also be included in city planning processes, increasing the feelings of safety for citizens.

Stakeholders – Public transport companies and local authorities.

## **Cultural normative and social barriers – strategies and tools**

<b>Cultural normative and social barriers</b>	<ul style="list-style-type: none"> <li>• The perception of the car: autonomy, speed, comfort and freedom tie in with important traits of modern lifestyles</li> <li>• Use of public transport is considered low status compared to the use of private cars</li> <li>• Public transport is not considered a natural and realistic alternative to the car</li> </ul>
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The research has not been able to identify opportunities or policy solutions for the barrier mentioned above. Attempts to tackle this area require a comprehensive European-wide cultural shift over a significant period of time. It is most likely that this will occur through a combination of previously suggested efforts to tackle other related barriers, but specific measures to tackle such a complicated issue a deemed to be beyond the scope of this work.

## **Economic barriers – strategies and tools**

<b>Economic barriers</b>	<ul style="list-style-type: none"> <li>• A car is a necessity – the fixed costs of car use is not considered when compared with public transport</li> <li>• Relatively low fuel prices</li> </ul>
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#### **Tactical taxation – Economic Tools**

The perceived high price for public transport, coupled with the relatively low prices of fossil fuels is a major barrier here, and the ability to navigate and act politically to counter these issues is fairly limited. However, one possible instrument that was suggested was combination of lower prices for public transport, combined with higher taxations for certain kinds of private car usage. The revenue from the latter should be used to finance improvements in public transport.

The national governments would be the most important stakeholders here, together with public transport companies and organisations.

### Drivers Licence Swap scheme – Economic Tools

A creative instrument from CH is the exchange of drivers' licenses for using public transportation almost for free. This was a campaign previously tested in Switzerland where people with drivers license could temporarily submit their licence in exchange for a month-long travel pass for just CHF 10,- . This could also be seen as a possible instrument to lower the levels of short distance driving.

Stakeholders could be national energy advisory entities in cooperation with national transport entities.

## Knowledge based barriers – strategies and tools

### Knowledge based barriers

- Low knowledge of the total costs of car use, compared to use of public transport

### Removing misinterpretations of cost – Consumer Information

The car is often seen as a necessity for many households, thus fixed costs linked to having a car are not included when compared with prices for public transport. The perceived price difference between public transport and car use needs to be addressed. Information campaigns should provide more accurate information on the total costs of travelling by car compared to public transport.

Natural stakeholders would be national agencies for energy advice supported by local government bodies.

### Evaluation and expansion of EU-labelling of vehicles – Economic Tools

An existing measure to tackle vehicle emissions in the EU, is to classify vehicles according to their CO<sub>2</sub> emissions (g/km). A heavily discussed topic in CH was whether this strategy works efficiently. For instance, participants in focus groups criticised the fact that CO<sub>2</sub> was only measured relative to weight, making some heavy cars compare favourable to lighter, more energy efficient cars:

"I find the energy efficiency classes on cars really confusing. How is it possible that a Smart and a Mercedes or an Audi with 300 horse power both can have an energy efficiency class of A but emit different amounts of CO<sub>2</sub>?"

"We have these labels for cars now, too. Understanding the labels however is quite difficult. For example, there are more energy efficient cars which are large and consume a lot of fuel in comparison to a small car. The calculation works, I assume, for a European unified formula. I would not just buy an A-labelled car, but I would first ask what it actually means."

An evaluation of the current system should be considered, as the classification system seems to have confused consumers. This will inevitably undermine trust and credibility in this, and possibly other, schemes. In the future, vehicle labelling should be simplified so that it accounts for vehicle size and weight, and facilitates easier consumer choice.

The stakeholder would be the relevant EU body.

## Political barriers – strategies and tools

<b>Political barriers</b>	<ul style="list-style-type: none"> <li>• City planning is often focused around the use of the private car</li> <li>• The lack of investment in public transportation often means a sub-standard service</li> <li>• Lack of government support for a change towards public transport</li> </ul>
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### Develop car free zones in cities – Change Infrastructure

“Car free zones” have been implemented in several European cities already. The basic idea of such zones is to close certain areas of the city for private cars, or only allow car to enter at designated times. Such schemes reduce traffic in these zones and create safer sections of highway, in an attempt to promote alternative forms of transport.

Stakeholders here would be the local authorities, possibly in cooperation with larger political agencies to ensure sufficient support from above.

### Congestion charges – Economic Tools

Closely related to car free zones are schemes like the London Congestion Charging Scheme (UK). Here drivers are charged if they enter central London at peak times. This is an instrument that could be rolled out in our European cities. Such programs have dual benefits as they both reduce the relative cost of public transport and provide financing for infrastructure improvements. In NO, NL and CH congestion charges were seen as worthwhile instruments to reduce inner city traffic. However, consumers in our study also expressed doubts about this scheme, often taking cynical views that the increased revenue was not spent in the designated area. It is therefore important to ensure greater transparency in such schemes and encourage public faith in the aims and objectives of congestion charge projects.

Relevant stakeholders would be local authorities in cooperation with public transport companies and national government agencies.

### Improving public transportation service and infrastructure<sup>2</sup> - Change Infrastructure

Good infrastructure is fundamental for any successful public transport service. An example of this can be found in CH, where high levels of funding for recent improvements have helped create a highly regarded train service. Alternatively, Norway’s public transport system has notorious reputation large due to it a poor infrastructure.

Parisian people have fewer cars than others<sup>3</sup>, partially due to an efficient public transport network and partially because of notorious traffic congestion. This indicates that improving the infrastructure of public transport networks and more stringent town planning could have positive impacts on energy saving.

Political initiatives to create more bus lanes, thereby allowing circumnavigation of congestion, shortening journey times and providing a more reliable service, is also a useful instrument in the political toolbox.

The main stakeholders here are transport companies and national governments.

2) This is a general strategy that covers several of the barrier-spheres in this section. We have chosen to put it under the political barrier topic as we saw the political arena as the primary instigator of such initiatives.

3) INSEE (National Institute of Statistics, France) Insee-SOeS, ENT D 2008

### Attempts to create higher political acceptability – Consumer Information

Increasing the public acceptability of politically sensitive issues like higher taxation on car use, congestion charges, and car free zones is a strategy which could reap major benefits in the long term. Without need recognition and acceptability it is unlikely that politicians enforce such potentially unpopular initiatives. New forms of consultation processes need to be introduced to understand if more deliberative forms of consultation allow more social acceptability of politically sensitive initiatives, such as Congestion Charging Schemes.

The main stakeholders here are political agencies on several levels – on EU-level, national and local.

### Enforcing true pricing policies – Economic tools

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 areas discussed. Many stakeholders said that increasing oil prices would be the most effective way to ensure investments in infrastructure.

National governments can play a role in the determination of fuel prices in their countries, through taxation schemes for example. The CO<sub>2</sub> 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 (by encouraging walking, biking, car-sharing, etc.) more financially sensible and desirable. However, several of these instruments are politically controversial and inherently regressive. As such they may have to be coupled with attempts to create higher social acceptability and address distributional impact issues, such as those mentioned above.

National governments would be the primary stakeholders, additionally also the EU.

## 1.3.4

### Car pooling or sharing

The topic of car pooling or sharing was mainly discussed in the stakeholder interviews in CH, FR and the UK. Consumers in CH demonstrated the highest level of awareness of car pooling and sharing networks and initiatives.

Barrier categories	Examples
<b>Individual/ psychological barriers</b>	<ul style="list-style-type: none"> <li>• Need for pre-planning and flexibility</li> <li>• Sharing mitigates some of the positives of the private car – individual freedom, privacy</li> <li>• Convenience and habit of personal car use</li> <li>• There is a strong culture of individualism – sharing opposes some of these values</li> <li>• Safety concerns regarding unknown car-poolers</li> </ul>
<b>Knowledge based barriers</b>	<ul style="list-style-type: none"> <li>• Lack of information guiding consumers towards car sharing programs and networks</li> <li>• Costs of car sharing are compared only to the fuel costs of private car use</li> </ul>
<b>Physical and structural barriers</b>	<ul style="list-style-type: none"> <li>• Poor quality and quantity of the car sharing networks</li> </ul>

## Physical and structural barriers – strategies and tools

### Physical and structural barriers

- Poor quality and quantity of the car sharing networks

Several instruments and strategies for improving the quality of car sharing networks were suggested in both the stakeholder interviews and consumer focus groups.

### Increasing flexibility of local networks – Change in Infrastructure

Car sharing companies have made attempts to improve the accessibility of their vehicles beyond city centre locations, in a bid to increase take-up of the service. However, flexibility remains a key barrier. Without sufficient numbers of participants, the potential for 'free-floating' and 'multiport' car sharing services is limited. These offer the user significant increased flexibility in being able to pick up a vehicle from one location and return it to another, or a number of different locations. Our research suggests that flexibility and accessibility are fundamental to the success of car sharing services, which need to be perceived by the consumer as comparable with using a private car.

Telecoms service providers (i.e. mobile phone companies) also have a role to play in improving accessibility to car sharing, for example offering the facility to reserve and unlock cars with mobile phones (CH).

Key stakeholders for implementing such initiatives include transportation agencies within national government, working in cooperation with car sharing/pooling companies, and possibly national confederations for enterprises in connection with commuting and work-related initiatives.

### Offering tangible benefits for car-sharers – Legal Instruments/Economic Tools

Car sharing vehicles could be: exempt from any road pricing schemes and tolls; offered cheaper insurance rates; subsidised on the price per kilometre for low-emissions (where applicable); permitted to use bus lanes. National government is the key stakeholder here.

### Possible employer initiatives – Consumer Information/Economic Tools

Two major employers in the UK have encouraged around one third of their staff to take part in car-sharing, by offering financial incentives in the form of reduced parking fees for participants. Companies could also provide more options for working from home in a bid to reducing commuting miles.

'Liftshare' is an example of a UK initiative offering car-sharing opportunities on a national scale. Individuals can use the web-based service to locate others living in their area who have a similar commute to work. Liftshare currently has 104,000 members, resulting in some 41 million kilometres of shared journeys every year. Such approaches could be considered in other countries.

The most relevant stakeholders for implementing such initiatives would be larger public and private companies, with support from governmental bodies. The public sector could lead the way here, developing best practice examples for others to follow.

### Better coordination between car sharing initiatives and public transportation - Change in Infrastructure

Coordinating different initiatives, like car-sharing and public transportation (P+R), presents a major challenge. In CH, vehicles can be reserved around-the-clock, right up to when the time they are actually needed (i.e. no requirement for advance booking), thus

addressing the flexibility barrier. However, accessibility to the service is still limited and links between car-sharing locations and public transportation need to be improved (Lüthi et al., 2009).

Relevant stakeholders to oversee improved coordination between car sharing and public transportation would be local authorities in collaboration with car sharing companies.

## Knowledge based barriers – strategies and tools

<b>Knowledge based barriers</b>	<ul style="list-style-type: none"> <li>• Lack of information guiding consumers towards car sharing programs and networks</li> <li>• The complete car sharing costs are compared only to the fuel price of the private car</li> </ul>
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### Improving the profile and image of car-sharing initiatives – Consumer Information

Existing car-sharing schemes need to be more high profile than at present if the full potential of the service is to be realised. Car-sharing companies need to be more visible and more widely promote the benefits of the scheme to consumers. As with other energy saving initiatives, consumers need to be convinced that these alternatives are worthwhile and feasible, in terms of cost and daily practices, in addition to offering environmental benefits. Examples of successful car-sharing schemes from other countries could be used to help raise the profile of new initiatives. In doing so, acceptability may be enhanced, offering greater inclination for government intervention.

Providing reliable and accurate information comparing the cost of car-sharing with private car use could also prove highly effective, especially if the latter is to take account of all direct and indirect 'costs' (for example, maintenance, insurance, parking costs, and time-saving regarding finding parking spaces, commuting times, maintenance, etc).

Relevant stakeholders in this context include: national government transport/ environmental departments, in cooperation with car-sharing companies, and potentially also car-rental companies and/or car manufacturers/importers.

## Individual/psychological barriers – strategies and tools

<b>Individual/psychological barriers</b>	<ul style="list-style-type: none"> <li>• Need for pre-planning and flexibility</li> <li>• Sharing mitigates some of the positives of the private car – individual freedom, privacy</li> <li>• Convenience and habit of personal car use</li> <li>• There is a strong culture of individualism – sharing opposes some of these values</li> <li>• Safety concerns regarding unknown car-poolers</li> </ul>
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### Establish neighbourhood networks – Change in Infrastructure

Local communities can play a key role in establishing and facilitating car-sharing networks. The benefits may be two-fold: firstly, offering car sharing facilities at the neighbourhood level can improve accessibility and flexibility; secondly the community approach can help in raising awareness and overcoming safety concerns.

The key stakeholders are again, local authorities working in collaboration with car-sharing companies. Local community groups could also have a key role and

government incentives based on quantification of environmental, energy and climate change benefits of car sharing could offer a level of additional support.

**Certification of car-poolers – Legal Instruments**

A certification system for members of car-pools could be developed to counter concerns about safety. This concern was raised in FR, and is particularly pertinent to female car-sharers. Technical tools for tracking the movements of shared vehicles could also help to improve safety.

Car-sharing companies and the local police are the key stakeholders here.

## Annex



# Policy recommendations on Energy Saving

## 2.1.1

## Policy recommendations to overcome individual-psychological barriers

Policy recommendations to overcome individual-psychological barriers	
Field of application	Policy recommendations
<b>Domestic Energy Use</b>	<ul style="list-style-type: none"> <li>• See Political Recommendations under physical-structural barriers and knowledge based barriers. The suggested recommendations aim to provide the means to overcome the strong individual-psychological barriers present.</li> </ul>
<b>Household appliances</b>	<ul style="list-style-type: none"> <li>• See Political Recommendations under knowledge based barriers, which are closely related to the individual-psychological barriers.</li> </ul>
<b>Travel and Fuel Consumption</b>	<ul style="list-style-type: none"> <li>• <i>Economic tools/ Change in infrastructure- Congestion Charges/Car Free Zones</i></li> </ul> <p>Congestion charges or traffic charges could be introduced for cars entering specific areas of cities, or at specific times, (e.g. during rush hour). Cars with 2 or more persons in the car could be exempt in order to encourage car-sharing. The benefits are two-fold: public transport becomes relatively less expensive, and revenue can be reinvested in infrastructure improvements, and improved public transport services. Measures that limit individual freedom, through regulation of car use, or add to personal costs will face public scrutiny, so it is pivotal that transparency with regard to re-investment in public transport is upheld to support legitimacy of such measures amongst the public.</p> <p>Car Free Zones in cities, where restrictions are enforced at specific times/days, are also recommended.</p> <p>Relevant stakeholders would be National and local authorities in cooperation with public transport companies.</p> <ul style="list-style-type: none"> <li>• <i>Change in infrastructure - Shift in urban planning towards emphasis on improved public transport infrastructure</i></li> </ul> <p>Ensure that strategies and financial support is in place to enable a shift away from the private car, which has dominated much of urban planning to date, to a stronger emphasis on collective solutions, including public transport, and bicycle and pedestrian alternatives to private car use.</p>

<p>&gt; <b>Travel and Fuel Consumption</b></p>	<p>This measure is also suggested under the topic of short distance driving where public transport initiatives are naturally closely related.</p> <p>Infrastructure is fundamental to the success of public transport services and has been neglected in several of the countries of study for decades. As of now, better quality, flexibility and reliability are needed to make public transport a viable alternative, raising its profile, in addition to providing a quicker, more comfortable and frequent service.</p> <p>Parisian people have fewer cars than others<sup>4</sup>, which can be linked to the widespread public transport network and congestion problems. This indicates that improving the infrastructure of public transport networks, and imposing more stringent town planning that is not solely focused on private cars, have great potential to impact on energy saving if effectively implemented.</p> <p>Relevant stakeholders would be transport companies working in cooperation with local authorities and backed by support from national governments/EU.</p> <ul style="list-style-type: none"> <li>• <i>Economic tools/ Legal Instruments</i> -Provide economic and structural advantages for shared/pooled vehicles</li> </ul> <p>Governments could provide support and economic incentives to make car sharing and pooling more desirable, for example with cheaper insurance and lower annual taxes.</p> <p>In addition, shared or pooled vehicles could be given free parking, be exempt of fees on toll roads, and have the ability to use bus lanes. A process for identifying such vehicles would need to be implemented for these measures to work.</p> <p>Key stakeholders in these initiatives would be national governments.</p>
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## 2.1.2

## Policy recommendations to overcome physical-structural barriers

Policy recommendations to overcome physical-structural barriers	
Field of application	Policy recommendations
<p><b>Domestic Energy Use</b></p>	<ul style="list-style-type: none"> <li>• <i>Technical improvements and innovations - Energy steering Systems</i></li> </ul> <p>We suggest that further development and installation of energy steering systems should be a priority, both for existing and planned buildings.</p> <p>To encourage the installation of smart energy management systems that control lighting and temperature, we suggest making this measure mandatory for newly constructed buildings. In addition, economic incentives to aid the introduction and installation of these systems in existing buildings should be provided. An alternative option is to make installation of such systems mandatory in existing buildings within a fixed time frame (for example, 3 years), with economic support for installations also offered.</p> <p>The importance of educating consumers must be noted here, as the optimal technical solutions and structures do not necessarily equal energy saving actions alone (Jackson, 2005). It is important to make sure that new and innovative energy saving technology is as user friendly as possible. This is a challenge for the manufacturers and consumer organisations.</p> <p>Stakeholders would primarily be National or EU-governing bodies, but also manufacturers of heating and lighting solutions, in cooperation with consumer representatives or organisations. Local authorities and local political agencies might also play a role in embedding these initiatives at a local level.</p>

<p><b>Travel and Fuel Consumption (1)</b></p>	<ul style="list-style-type: none"> <li>• <i>Change in infrastructure - Shift in city planning to provide a more eco-friendly infrastructure</i></li> </ul> <p>The research identified a need for improved city planning and a shift in initiatives and incentives to encourage more widespread walking and biking for short distances.</p> <p>It is evident that much of the current urban infrastructure throughout Europe is built to support and accommodate the use of private cars, and city planning is consequently still often centred on private car use. We suggest a shift towards providing a more eco-friendly infrastructure to limit short distance driving and encourage alternative means of transport.</p> <p>There are numerous examples of cities to look to for examples of how to improve the conditions for sustainability in regard to transport infrastructure. For example, in the Dutch town of Houten, the city transportation network was developed in such a way that you can move around the town much quicker by bike than by car, eliminating some of the major barriers against short distance driving (for example flexibility, journey time).</p> <p>To avoid the inertia amongst local politicians and unrest in the local populations due to regulations in private car use, the logical way forward might be to first improve infrastructure supporting alternative means of transport, and only start enforcing regulatory measures on unsustainable behaviour when alternatives of sufficient quality and quantity are available.</p> <p>Relevant stakeholders would be local authorities backed by support of national governments/EU.</p> <ul style="list-style-type: none"> <li>• <i>Change in infrastructure - Improve the quality of P+R services</i></li> </ul> <p>There are several instruments related to improving the Park and Ride services and related infrastructure around and within city centres. These include: increasing frequency of shuttle units; more up to date travel information to encourage the use of P+R; ensuring sufficient infrastructural capacity at rush hours. Such initiatives are important to ensure consumer motivation and satisfaction are comparable with driving their car.</p> <p>Initiating park-and-bike services or cheap city bicycle networks could also stimulate people to reduce short distance driving.</p> <p>The key stakeholders here include transport companies, with the support of local authorities, under the umbrella of national strategic transport directives.</p>
<p><b>Travel and fuel consumption (2)</b></p>	<ul style="list-style-type: none"> <li>• <i>Economic tools/ Change in infrastructure - Establish neighbourhood based car-sharing networks</i></li> </ul> <p>Local communities can play a role in the set up and facilitation of car-sharing networks. If networks are organised by local geography (neighbourhoods) or through common work-sites, this can increase convenience, flexibility and the availability of cars locally. It will also improve transparency and perceived safety and would be more likely to resonate with individuals and communities at a grassroots level.</p> <p>Stakeholders could include local authorities in cooperation with car-sharing companies and community groups, backed by national government initiatives.</p> <p>This can also be seen as an action to overcome knowledge based barriers linked with car-pooling or car sharing.</p>

<p>&gt; <b>Travel and fuel consumption (2)</b></p>	<ul style="list-style-type: none"> <li>• <i>Economic tools/ Legal Instruments- Provide Tax Advantages for Car Pooling Companies</i></li> </ul> <p>Economic incentives could be offered for the establishment of car pooling companies, for example, in the form of tax benefits or subsidies on cars, or competitive financing options.</p> <p>Firms could offer financial incentives for employees to use car sharing schemes to travel to work.</p> <p>Stakeholders would be national governments, in cooperation with official energy-saving entities.</p> <p>This suggestion also helps overcome the combined knowledge and economic based barriers linked with car-pooling or car-sharing, where there is widespread misunderstanding and misconceptions related to private car use compared with car-pooling or car-sharing.</p>
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## 2.1.3

## Policy recommendations to overcome knowledge-based barriers

Policy recommendations to overcome knowledge-based barriers	
Field of application	Policy recommendations
<p><b>Domestic Energy Use</b></p>	<ul style="list-style-type: none"> <li>• <i>Technical improvements and innovations - Smart metering</i></li> </ul> <p>Smart metering, combined with real time displays, provides direct feedback to enable the consumer to make conscious energy saving decisions. In addition to energy consumption, such displays should have options to enter current energy prices, so that consumers how much their energy is costing, over different periods of time.</p> <p>Ensuring that every home has a smart meter with real time display would be an important step in overcoming other barriers, including psychological or knowledge based, where information and motivation is closely linked. Smart metering, or other forms of consumption feedback, aim to make energy consumption more visible to the consumer, thus making them more aware of the link between daily practices and energy consumed. Without such direct feedback, household energy consumption level remains largely invisible to many consumers. Combined with tailored energy efficiency advice and pricing mechanisms these devices offer potential to empower the consumer to act, and see first hand the impact of their actions.</p> <p>Presenting information on feedback display in monetary terms appears fundamental to their success, as the research has shown consumers are mainly motivated by the potential for cost savings.</p> <p>However, further research is needed in this area. In particular, in relation to the optimum design for meters, the advice that needs to accompany their installation and the customer's interaction with this device and any price signal.</p> <p>Smart metering could be deployed through local authorities, governmental energy saving entities in cooperation with energy distributors and community groups to maximise consumer engagement.</p> <p>Smart metering is related to other recommendations including the price ladder structure and real-time feedback on appliances.</p>

<b>Household appliances</b>	<ul style="list-style-type: none"> <li>• <i>Technical improvements and innovations – Real Time feedback Panels</i></li> </ul> <p>Real time displays that show the consumer the energy consumption, emissions and cost related to their use could be built into larger appliances as a product standard.</p> <p>As with smart metering, such displays should have options to enter current energy prices, so that the consumers can read the explicit costs of their current energy use for a choice of specific periods of time. This would provide direct feedback to enable the consumer to make conscious energy saving decisions.</p> <p>Possible stakeholders could be relevant EU-Bodies and national governments in cooperation with manufacturers of appliances.</p> <p>This recommendation is seen as addressing the habitual individual-psychological barriers linked with appliance use and practices, and is directly linked with the price ladder structure recommendation. However, as noted above, further research is needed in relation to smart metering and the impact of real time displays. Furthermore, the roll out of smart metering and real time feedback devices at the household level could be sufficient in enabling the consumer to learn about the consumption levels of different household appliances. If the technology is supplied with appropriate levels of information and support, this could avoid the need for individual appliance-level displays.</p> <ul style="list-style-type: none"> <li>• <i>Information directed toward individual consumers and households - Information on use of appliances</i></li> </ul> <p>A distinct lack of consumer knowledge about energy consumption levels of appliances emerged in several of the countries studied. Greater awareness about efficient ways of using appliances is thus needed.</p> <p>Both smart metering and real-time displays can improve consumer understanding, but the research suggests consumers need more information about energy saving behaviour related to daily use of common appliances.</p> <p>However, it seems that the information itself is not lacking, but consumer motivation to seek it is. The dominance of the economic discourse in consumer discussions around energy consumption can be exploited as a motivational factor.</p> <p>Relevant stakeholders here would be national energy advice agencies/ environmental entities, in cooperation with energy suppliers, NGO's and local authorities.</p>
<b>Travel and Fuel Consumption</b>	<ul style="list-style-type: none"> <li>• <i>Legal Instruments - Critically evaluate the EU Energy Efficiency Label for Vehicles</i></li> </ul> <p>A critical evaluation of the EU-label for vehicles is needed to ensure its credibility. Currently, the efficiency of vehicles is measured relative to weight, with a possible consequence being that heavier cars compare well to smaller more efficient cars. When a Smart car is somehow classified in the same category as a large Audi there is potential for consumers to lose trust in the system. The label should therefore be re-evaluated.</p> <p>The key stakeholder here would be the relevant EU-body.</p>

## 2.1.4

## Policy recommendations to overcome economic barriers

Policy recommendations to overcome economic barriers	
Field of application	Policy recommendations
<b>Domestic Energy Use</b>	<ul style="list-style-type: none"> <li>• <i>Legal Instruments - Price Ladder Structure</i></li> </ul> <p>Low price levels for domestic energy were seen as a primary barrier against savings in most of the countries of study. Regulatory measures, such as higher taxation levels, were frequently discussed during the focus groups. Consumers often initially expressed a negative stance towards such measures, although many also openly admitted that such “push measures” might produce the best results.</p> <p>There were also suggestions from the data that the resistance towards regulatory measures was often short-lived, and that consumers would often accept reasonable changes and regulatory measures after this initial period.</p> <p>To combat waste, over-consumption and the economic barrier of energy costs being relatively quite low, we suggest implementing a price ladder structure. This entails the unit price to gradually increase with increased household energy consumption, thus providing a clear incentive to keep consumption to a minimum.</p> <p>Similar measures, such as increased energy prices at peak times and pricing per litre hot water consumed, could also be considered.</p> <p>The involved stakeholders would most likely be local energy suppliers in collaboration with national governments and also local authorities.</p> <p>This recommendation is closely linked with, and dependent upon, other suggestions, including “Smart Metering”, “Real Time Feedback Panels” on appliances and “Energy Steering Systems.” As with all these areas, further research is needed to better understand consumer response to pricing signals.</p>
<b>Travel and Fuel Consumption</b>	<ul style="list-style-type: none"> <li>• See Political Recommendations under knowledge based and physical-structural barriers when it comes to car-pooling and car-sharing, as these recommendations are closely related to the individual-psychological and economic barriers under this topic.</li> </ul>





## Annex



# Examples of measures in energy efficiency

This section of the Annex presents a wide range of potential measures that have, or could be, adopted to encourage energy efficiency. These do not represent recommendations, as such, but aim to give a comprehensive overview of tools and initiatives suggested by stakeholders and consumers in the empirical research.

Policies	Field of application	Barriers to overcome	Examples and lessons learned from investigated countries
<b>Exemplary measures to overcome knowledge-based barriers (in alphabetical order)</b>			
<b>Energy efficiency education in schools (support, information and voluntary action)</b>	<ul style="list-style-type: none"> <li>• Energy efficient refurbishment</li> <li>• Purchase of energy-efficient appliances</li> <li>• Purchase of energy-efficient cars</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of knowledge of homeowners</li> <li>• Lack of detailed and specific information</li> <li>• Low awareness of the connection between purchase and energy issue</li> <li>• Information concerning energy consumption difficult to understand</li> <li>• Consumers are sceptical about environmental claims</li> </ul>	<ul style="list-style-type: none"> <li>• Many <b>NO</b> focus group participants identified the potential for children to act as 'environmental ambassadors', by sharing knowledge from school with their families and raising awareness of environmental issues and the need to save energy in the home.</li> <li>• In <b>CH</b> and <b>HU</b> focus group participants suggested that schools could cover energy efficiency and climate change as part of the curriculum.</li> <li>• For some <b>UK</b> focus group participants, ensuring the longevity of energy saving behaviour, by influencing the next generation, was hugely important. Schools and colleges were considered fundamental in mainstreaming this message.</li> <li>• One interesting initiative mentioned was a partnership between the <b>HU</b> government and Energy Service Companies to improve the energy efficiency of buildings used for public education. Heating, lighting and insulation was upgraded in these buildings providing an example of best practice for school children and their parents alike.</li> </ul>
<b>Improved marketing efforts (initiatives from businesses)</b>	<ul style="list-style-type: none"> <li>• Purchase of energy-efficient appliances</li> <li>• Purchase of energy-efficient cars</li> </ul>	<ul style="list-style-type: none"> <li>• Energy efficiency is not a first order buying criteria</li> <li>• Low priority of fuel efficiency for car buyers</li> </ul>	<ul style="list-style-type: none"> <li>• Stakeholders praised the efforts of manufacturers in improving the image of energy efficient appliances and vehicles.</li> </ul>

<p><b>Indication of energy costs (support, information and voluntary action)</b></p>	<ul style="list-style-type: none"> <li>• Energy efficient refurbishment</li> <li>• Purchase of energy-efficient appliances</li> <li>• Purchase of energy-efficient cars</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of cost transparency</li> <li>• Buyers are guided by a cost/gain perspective</li> </ul>	<ul style="list-style-type: none"> <li>• Focus group participants in <b>NL</b> identified a need for "financial information" about the energy consumption of appliances. To be meaningful to consumers, information should be presented in monetary terms rather than kWh. All four focus groups conceded that purchase decisions were made mainly on a financial basis, thus providing monetary-based information would help consumers to make informed choices.</li> <li>• One participant in <b>NO</b> referred to an energy monitor he had bought. The device allows the consumer to measure the energy consumption of an appliance and estimate how much it costs to run. Consumers expressed interest in these being more widely distributed.</li> <li>• The findings from the project suggest messages about energy efficiency need to be framed in the context of personal financial gain. The quantitative survey showed that most people were motivated by the potential to save money (<b>90% in HO, 86% in FR and the UK, 84% in CH, 80% in GR, 74% in Norway, 71% in the NL</b>). This echoed by suggestions in the stakeholder interviews for information campaigns to focus on the financial gains of energy efficiency.</li> </ul>
<p><b>Information campaigns (support, information and voluntary action)</b></p>	<ul style="list-style-type: none"> <li>• Energy efficient refurbishment</li> <li>• Purchase of energy-efficient appliances</li> <li>• Purchase of energy-efficient cars</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of knowledge of homeowners</li> <li>• Lack of knowledge about existing policy incentives</li> <li>• Awareness of the connection between purchase and energy issues</li> <li>• Information concerning energy consumption difficult to understand</li> </ul>	<ul style="list-style-type: none"> <li>• NGO's were considered the main contributors in raising public awareness through information campaigns.</li> <li>• For the required transition from general advice to detailed and specific solutions for individual homeowners, one <b>NO</b> interviewee suggested looking to his neighbouring countries: <b>Sweden</b> has established energy efficiency advisory boards/offices in its municipalities, and <b>Denmark</b> advises consumers through the membership forums of a variety of organizations.</li> <li>• In <b>FR</b> stakeholders made reference to "Energy Info Rooms". These are part of a network developed by ADEME (the French Environment and Energy Management Agency) and local authorities. They offer a local point source of information and advice on energy efficiency and climate change to householders (including insulation, refurbishment, etc. and support available). There are some 160 "Energy Info Rooms" established in France.</li> <li>• In <b>CH</b>, there have been a number of efforts to improve knowledge and awareness about refurbishment for the purpose of energy efficiency, at various levels, including by the Swiss Federal Office of Energy, the Swiss Homeowner's Association, and administrative authorities. As a result, consumers have access to expert advice and consultancy services through their local authority. The MINERGIE label - a registered quality label for new and refurbished low-energy-consumption buildings, supported by the Swiss Confederation, the Swiss Cantons and the Principality of Liechtenstein</li> </ul>

			<p>along with Trade and Industry – has played an important role in the awareness campaign. Furthermore, recent political activity has generated significant interest in refurbishment.</p> <ul style="list-style-type: none"> <li>• Information at the point of purchase was considered essential by stakeholders interviewed, especially in for fridges and freezers as these usually constitute “distress purchases”, i.e. they are purchased because the old appliance has broken and needs immediate replacement.</li> <li>• In <b>CH</b>, stakeholders referenced the ‘topten’ guide (<a href="http://www.topten.ch">www.topten.ch</a>). This online tool compares products based on a range of purchasing criteria, including running cost. The objectives of the guide are to first inform consumers and make them aware of the operating costs of certain appliances, and second to become a reference tool for all stakeholders, increasing transparency in the market. Based on the Swiss concept, a similar guide was created in <b>FR</b>. It is, however, not yet widely renowned.</li> <li>• In <b>CH</b>, stakeholders noted that energy efficiency is discussed in daily newspapers, with features dedicated to the topic generally and energy efficient devices more specifically. Such coverage was considered very important by the interviewed stakeholders due to its potential to reach a much larger audience than specialty magazines; and the latter are read primarily by those customers who are already aware of the issues.</li> <li>• In <b>FR</b>, stakeholders noted that communication campaigns in relation to household appliances have been initiated by various stakeholders, including: manufacturers, ADEME and the Appliances Manufacturers’ Federation. They each communicate through campaigns in the press; specialized trade shows; advertising slogans; or more innovative actions such as cross-communication. These have generally been well received by all the stakeholders. They are however considered insufficient in number and scale to maintain momentum for change.</li> </ul>
<p><b>Mandatory energy performance certificates for buildings (regulatory measure)</b></p>	<ul style="list-style-type: none"> <li>• Energy efficient refurbishment</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of cost transparency</li> <li>• Problem of split burden between owner and tenants</li> </ul>	<ul style="list-style-type: none"> <li>• The implementation of the Energy Performance of Buildings Directive has resulted in the development of home energy labels, in the form of Energy Performance Certificates (EPCs) in all countries. In the <b>NL</b> (1996), the <b>UK</b> (2007), <b>NO</b> (2008), <b>HU</b> (2009) and <b>FR</b>, the EPC is now mandatory for new homes and in buying and selling transactions, and was considered to be very worthwhile by many respondents.</li> <li>• In the <b>NL</b> in particular, the EPC was received very positively by the stakeholders interviewed. The government had clearly stated its long-term commitment to the EPC, which enabled commercial organizations to prepare and plan for it. This resulted in more energy-efficient buildings being built before the</li> </ul>

			<p>standard was officially established.</p> <ul style="list-style-type: none"> <li>• In the <b>UK</b>, the advent of EPCs was also perceived as an important and long overdue policy by the stakeholders interviewed.</li> <li>• <b>CH</b> started a voluntary test phase in August 2009 (cf. <a href="http://www.geak.ch/">http://www.geak.ch/</a>). Following this, the administrative authorities will decide whether to adopt EPCs and, if they decide in favour, which buildings to include (size, type, etc.). The interviewees had differing opinions regarding whether or not building energy certificates should be required by law. Most shared the view that the certificates should be mandatory, otherwise no one would pay attention to them and it would take too long for them to become established in the market. However, there were concerns over the financial implications for homeowners and the potential impact on property values and mortgage arrangements.</li> <li>• Furthermore, focus group respondents in <b>FR, HU</b> and <b>NO</b> who had experienced the energy label first hand did not see it as particularly useful. Although a few participants viewed the policy as an effective way of adding value to property, some simply saw it as another layer of unnecessary bureaucracy and another means of getting money from citizens. The pessimism of consumers was reflected in their belief that many homes would have a low rating.</li> <li>• However, it should be noted here that there was evidence of a lack of understanding about EPCs. Thus some of the apparent scepticism surrounding the label may be based on misconceptions rather than sound knowledge.</li> </ul>
<p><b>Mandatory energy efficiency labelling of appliances (regulatory measure)</b></p>	<ul style="list-style-type: none"> <li>• Purchase of energy-efficient appliances</li> </ul>	<ul style="list-style-type: none"> <li>• No labelling of specific product categories</li> <li>• For small or luxury products, energy efficiency is not taken into account</li> <li>• Low awareness of the connection between purchase choice and energy issues</li> </ul>	<ul style="list-style-type: none"> <li>• Energy efficiency labels show the energy rating of an appliance relative to other models.</li> <li>• <b>In all countries</b>, energy labels are mandatory for many products and generally regarded as a big success in communicating information to consumers. They increase consumer awareness through simple and understandable means and have been widely accepted by consumers, political, and economic players.</li> <li>• However, it was felt that there was a need to expand energy labelling to include additional product categories to make the benefits more widespread.</li> <li>• In addition, focus group participants and stakeholders felt a need of a revision of the entire labelling scheme of household appliances.</li> </ul>

<p><b>Provision of energy audits (support, information and voluntary action)</b></p>	<ul style="list-style-type: none"> <li>• Energy efficient refurbishment</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of knowledge of homeowners</li> <li>• Lack of cost transparency for energy efficient refurbishment</li> <li>• Lack of detailed and specific information</li> <li>• Lack of knowledge about existing political incentives</li> </ul>	<ul style="list-style-type: none"> <li>• In the <b>UK</b>, the "Green Doctor Project" (e.g. <a href="http://www.eastmidlands.groundwork.org.uk">www.eastmidlands.groundwork.org.uk</a>) is an example of a widely available, personalized advice service, targeted at "lower income households". It aims to address issues associated with increases in energy prices and energy efficiency. 'Green Doctors' visits are free of charge and partly funded by utility companies and supported by a range of public and private sector bodies. Besides providing information and advice, some specific technical and more hands-on measures might be addressed, including the installation of energy saving light bulbs, draught excluders, radiator panels, etc.</li> <li>• The 'expert visitor' concept was suggested during the <b>NO</b> focus group discussions in relation to the desire for household-specific information. The idea of having personal, in-home advice and support from an energy saving expert was very positively received.</li> <li>• Also <b>CH</b> focus group participants suggested that home energy performance audits, to identify potential areas for improvement, should be more common place. A need for face-to-face advice for some householders in conducting home energy audits was also identified:</li> </ul> <p><i>"In other areas, such as the health insurance sector, there are a lot of consultants who come into your home and show you saving potential. Such consultants would be useful in the field of energy, too." (Swiss focus groups)</i></p>
<p><b>Provision of specified feedback / more targeted messaging (support, information and voluntary action)</b></p>	<ul style="list-style-type: none"> <li>• Energy efficient refurbishment</li> <li>• Purchase of energy-efficient appliances</li> <li>• Purchase of energy-efficient cars</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of detailed and specific information</li> </ul>	<ul style="list-style-type: none"> <li>• According to Abrahamse et al., (2007), information tends to result in higher knowledge levels, but not necessarily in behavioural changes or energy savings. A concept that is echoed by many other researchers in the field.</li> <li>• Thus information has to be more personalised, targeted, and framed within the lifestyle constraints of the individual to be effective. In addition, information campaigns often focus on "sermons" or social responsibility, with little potential to actually increase the capacity of households to act.</li> <li>• This was also confirmed by several focus group participants. Although awareness-raising campaigns were seen as important and sometimes even essential in the <b>FR</b> focus groups, they were also criticized for giving advice that is too generic, abstract and focused on making householders feel guilty. Specific information that gives householders the necessary knowledge and tools to apply this information to daily practices is needed.</li> <li>• An interesting case study demonstrating the effectiveness of specific information is presented by Gudbjerg and Gram-Hanssen (2006). They describe a standby campaign with 30 households in <b>Denmark</b>: written information mailed to households about the potential for reducing consumption through standby</li> </ul>

			<p>had almost no impact, whilst a home visit by an energy consultant, who showed householders where electricity was wasted due to standby, had a much bigger effect.</p> <ul style="list-style-type: none"> <li>• In the <b>NO</b> focus groups, one suggestion was to have a web-based "virtual house/apartment", performing the function of an "energy saving calculator". This could enable the consumer to calculate and see first hand the potential savings – in monetary, consumption and environmental terms- from different investments and behaviour changes. This could be extended to include several related fields (e.g. transportation, use and investment of different appliances, home improvements, etc).</li> </ul>
<p><b>Public leadership program / Role model of government bodies (support, information and voluntary action)</b></p>	<ul style="list-style-type: none"> <li>• Energy efficient refurbishment</li> <li>• Purchase of energy-efficient appliances</li> <li>• Purchase of energy-efficient cars</li> </ul>	<ul style="list-style-type: none"> <li>• Low priority of energy efficiency</li> <li>• Consumer inertia</li> <li>• Consumers are sceptical about environmental claims</li> <li>• Fear of unknown technologies</li> <li>• Insufficient governmental support</li> </ul>	<ul style="list-style-type: none"> <li>• Trustworthy sources, such as government agencies or consumer organisations, could provide best practice examples showing consumers the potential savings (again in financial and environmental terms) of different actions.</li> <li>• In the <b>NO</b> focus groups, several participants suggested good role models are needed to take the lead on environmental issues. Government offices, including ENOVA (a public body to promote environmental restructuring of energy generation and consumption in Norway, <a href="http://www.enova.no">www.enova.no</a>), the Consumer Advisory (<a href="http://www.forbrukerradet.no">www.forbrukerradet.no</a>) and Husbanken (<a href="http://www.husbanken.no">www.husbanken.no</a>, the main agency for implementing Norwegian housing policy) were mentioned as legitimate sources for dissemination of information.</li> <li>• In the <b>NL</b> focus groups, participants revealed a lack of trust in messages from the government or private companies. It appeared that individuals did not fully trust information about energy efficiency unless it was supported by more than one party (i.e. government + company; company + consumer organizations). Participants suggested that a combination of several agencies providing the same information, alongside greater transparency regarding the source of information, was needed to increase public trust in sustainability messages.</li> </ul>
<p><b>Exemplary policy instruments to overcome economic barriers (in alphabetical order)</b></p>			
<p><b>Bonus-Malus schemes (financial and fiscals incentives)</b></p>	<ul style="list-style-type: none"> <li>• Purchase of energy-efficient cars</li> </ul>	<ul style="list-style-type: none"> <li>• Low priority of fuel efficiency of car buyers</li> <li>• Inefficient cars are still affordable</li> </ul>	<ul style="list-style-type: none"> <li>• Attempts to encourage fuel-efficient vehicles have included schemes such as Bonus-Malus, which aimed to reward consumers on the purchase of efficient cars and penalise for the purchase of inefficient cars, by imposing an additional tax (malus) on the latter, and offering a state funded money-back system (bonus) for low emission vehicles.</li> <li>• Wüstenhagen and Sammer (2007) investigated whether the planned introduction of a bonus-malus system could reinforce the effect of the EU energy label. They showed</li> </ul>

			<p>that introducing a bonus of 1,800 CHF for an A-labelled car, or 1,200 CHF for a B labelled car could increase the effectiveness of the EU energy label.</p> <ul style="list-style-type: none"> <li>• Many participants in the <b>CH</b> focus groups supported the 'polluter pays' concept, such that people who can afford high emission lifestyles, e.g. through driving larger cars, are taxed for the privilege.</li> </ul>
<p><b>Offer of zero-interest eco-loans by banks (initiatives from businesses)</b></p>	<ul style="list-style-type: none"> <li>• Energy efficient refurbishment</li> </ul>	<ul style="list-style-type: none"> <li>• Higher initial investment costs</li> </ul>	<ul style="list-style-type: none"> <li>• Low or zero interest mortgages offered by banks can help to overcome high initial investment costs.</li> <li>• In the <b>FR</b> focus groups, the concept of a zero-interest eco-loan was discussed. This is a loan granted by banks, under the supervision of the Ministry of Ecology, and has been in place since 1 April 2009. It applies to homeowners of properties built before 1990 who want to carry out energy efficiency improvements (insulation, window replacement, etc.) in their primary residence. The maximum loan amount is 30,000. This initiative appeared far more socially acceptable to participants than the carbon tax.</li> <li>• In Switzerland, banks (e.g. CreditSuisse) offer a special "Minergie mortgage" which is a packaged solution for consumers who wish to build or purchase Minergie compliant residential property. In addition to extended financing, a longer pay back period, and a lower imputed affordability calculation, the costs of Minergie certification are included in the package.</li> </ul>
<p><b>Scrappage scheme (financial and fiscals incentives)</b></p>	<ul style="list-style-type: none"> <li>• Purchase of energy-efficient cars</li> </ul>	<ul style="list-style-type: none"> <li>• Low priority of fuel efficiency of car buyers</li> <li>• Inefficient cars are still affordable</li> </ul>	<ul style="list-style-type: none"> <li>• Vehicle scrappage schemes are usually framed as promoting the replacement of old, inefficient cars with modern varieties. However, in reality scrappage programs have usually had the additional underlying aim of stimulating the automobile industry. During the financial crises which began in 2008 many European countries introduced such programs to increase market demand.</li> <li>• To place greater emphasis on the environmental aspect, scrappage schemes could include an emissions requirement (e.g. the old car would need to be older than 10 years and the new car would need to meet a particular CO<sub>2</sub> emission standard). However, the recent schemes introduced in the <b>NL</b> and <b>UK</b> did not require any such standards. The Dutch government provided a premium of €750 or €1000 in association with the automobile industry and the UK offered a flat rate £2000 cash incentive for all vehicles of 10 years or older (shared with 50% by the government and 50% by the automobile industry).</li> <li>• According to marketers, people are mostly guided by emotions and such a scrappage scheme works like a rebate which is perceived as a reward system. According to a marketing expert, a sum of €2500 in the context of replacing an old car is perceived as an enormous,</li> </ul>

			<p>unexpected amount of money. In addition, the fact that the money is provided by the government plays an important role, as such “rebates” receive additional legitimacy. One further important pillar is that the scheme is for a limited time only, which activates the ‘chase modules’ in the brain (Der Spiegel, 2009).</p>
<p><b>Subsidies (financial and fiscals incentives)</b></p>	<ul style="list-style-type: none"> <li>• Energy efficient refurbishment</li> <li>• Purchase of energy-efficient appliances</li> <li>• Purchase of energy-efficient cars</li> </ul>	<ul style="list-style-type: none"> <li>• High initial costs of refurbishment</li> <li>• Insufficient governmental financial support</li> <li>• Higher initial costs of energy efficient household appliances</li> <li>• Low income households without cash or access to credit</li> </ul>	<ul style="list-style-type: none"> <li>• Although highly valued by the public, the success of subsidies for refurbishment has been relatively modest to date.</li> <li>• Subsidies in the <b>UK</b> (e.g. through the Warm Front programme, which provides grants for energy efficient refurbishment to low income households, and energy supplier funded CERT schemes) have focused support on low cost measures, such as loft and cavity wall insulation. They are also intended to help develop the supply chain on infrastructural insulation and energy efficiency measures.</li> <li>• In <b>CH</b>, some administrative districts offer financial support for energy efficient refurbishment, though the level of support is small when compared to tax deductions and the amount set aside is often very quickly used up. The success of such efforts may be seen in individual cases, but is less evident on a larger scale.</li> <li>• In <b>HU</b>, the National Energy Efficiency Program supports investment in energy efficiency measures (insulation of buildings, windows and doors, modernization of the heating system) and the application of renewable energy measures. Thresholds and conditions of support change every year, but in 2007 households could apply for a maximum of 15% of their total investment. The “Panel Plus” Program is a loan program that started in 2005. Loans and grants are available for investments to improve the thermal insulation of buildings (roofs, doors, windows, facades and cellars) as well as for the modernization of district heating. The second stage known as the ‘Panel Programme’ involved retrofitting apartment blocks. Most of the flats involved in the programme were privately owned, which presented a challenge in securing agreement to retrofit. In order to select buildings to take part in the Panel Programme, cooperatives of flat owners within a building were invited to submit an application. Selection of participants was based on a rating system, with points allocated according to a range of factors, such as the age of the building, the architecture, the level of commitment of the group to improving the building (in terms of both effort and finances) and the importance of the building in the cityscape.</li> <li>• In the <b>HU</b> focus groups, the Panel Programme was generally perceived in a positive light, mainly due to the government funded facet. The problem, however, lay in the amount of funding, which was considered too small,</li> </ul>

			<p>and the need to self-fund the remainder, thus limiting accessibility to the scheme. Therefore, regarding the Panel Programme and the Energy Saving Programme, there was significant onus placed on the authorized representative (in the block of flats or housing estate) to know every detail about the Programme and explain it properly to tenants.</p> <ul style="list-style-type: none"> <li>• In the <b>NL</b>, government subsidies have been introduced and have been successful in increasing sales of the more energy-efficient household appliances. However, subsidies have been reduced over the last few years as a result of their success, i.e. they became too expensive. Norwegian stakeholders also suggested providing subsidies for the highest classified products (cf. Denmark).</li> <li>• In <b>CH</b>, ewz (Elektrizitätswerk Zürich) offered subsidies of EUR 60 and EUR 120 for some 6,500 A+ and A++ cold appliances respectively, between 2003 and 2006. The program continues until 2011 but has been limited to A++ cold appliances since 2007 (topten, 2010).</li> </ul>
<b>Tax incentives (financial and fiscals incentives)</b>	<ul style="list-style-type: none"> <li>• Energy efficient refurbishment</li> </ul>	<ul style="list-style-type: none"> <li>• Higher initial costs</li> <li>• Insufficient governmental support</li> </ul>	<ul style="list-style-type: none"> <li>• In <b>FR</b>, subsidies take the form of tax incentives from the government. However, these are deemed insufficient and above all, have often been diverted from their original purpose by firms who use them as an excuse to increase prices.</li> <li>• In <b>CH</b>, the cost of refurbishment for the purpose of energy efficiency can be deducted from taxes. However, this means partial refurbishment is currently more financially beneficial than complete refurbishment, even though the latter is preferential from an energy savings perspective.</li> </ul>
<b>Exemplary measures to overcome physical and structural barriers</b>			
<b>Automatic low power mode (regulatory measure)</b>	<ul style="list-style-type: none"> <li>• Purchase of energy-efficient appliances</li> </ul>	<ul style="list-style-type: none"> <li>• No automatic switch-off for low power modes</li> </ul>	<ul style="list-style-type: none"> <li>• Progress has been made in reducing the power consumption of many electronic, following previous recommendations for a 1-Watt Standby power target. In January 2010, the Ecodesign standby and off mode regulation came into force. In the first phase, the regulation requires appliances to have a standby consumption no more than 1W. In phase II, which begins in 2013, electronic products must have an automatic power down mode, which will switch to standby or off “after the shortest possible period of time appropriate for the intended use of the equipment”.</li> <li>• During the focus groups, participants expressed frustration that some appliances require action from the user to fully turn them off. Ensuring that appliances shut down automatically when not being used is technically possible.</li> <li>• This need for an automatic power-down modus was confirmed by <b>CH</b> focus group participants. Some of</li> </ul>

			<p>the participants openly admitted that they are too lazy when it comes to switching off their appliances and would benefit from an auto shut down function. Consumer opinion is therefore aligned with the latest policy directive and would even support stricter implementation.</p>
<p><b>Education and training of professionals (support, information and voluntary action)</b></p>	<ul style="list-style-type: none"> <li>• Energy efficient refurbishment</li> <li>• Purchase of energy-efficient appliances</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of competent artisans</li> <li>• Lack of knowledge of relevant professionals</li> <li>• Lack of competent salespeople</li> </ul>	<ul style="list-style-type: none"> <li>• In <b>HU</b>, stakeholders made reference to conferences and education programs that have been organized to educate professionals.</li> <li>• In <b>CH</b>, there are continual improvements, new courses, trade shows, etc. where professionals can learn more. Bau-Schlau (intelligent building), for instance, is a campaign of SwissEnergy to promote sound energy use in buildings. Developers and property owners can obtain information and useful hints on energy-efficient construction and renovation from local energy offices and advisory centres, and at <a href="http://www.bau-schlau.ch">www.bau-schlau.ch</a>.</li> <li>• A gap was identified in the level of consultant services available to developers. There emerged a demand for consultation with experts in all areas of refurbishment, including aspects unrelated to energy. Such <b>'refurbishment managers'</b> 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.</li> <li>• In the <b>UK</b>, there has been awareness raising activities across the whole supply chain. These include: encouraging trade associations to talk to members about the value of energy efficient goods; working directly with retailers, manufacturers and product designers, such that staff at all levels, from procurement personnel to sales staff are aware of the principles of energy efficiency. High turnover of sales staff has to some extent limited the impact of training. Other efforts have included encouraging product designers and manufacturers in China and other countries to adopt an energy efficiency standard. This transnational working with the supply chain has potential to address some of the barriers to more efficient appliances.</li> <li>• Participants of the <b>CH</b> focus groups also mentioned that sales staff have a significant role in communicating relevant information to consumers, but they often lacked the necessary training and knowledge to fulfil this role.</li> </ul>

<p><b>Establishing collective coordinating bodies (support, information and voluntary action)</b></p>	<ul style="list-style-type: none"> <li>• Energy efficient refurbishment</li> </ul>	<ul style="list-style-type: none"> <li>• Ownership structure: little influence of tenants on energy efficiency refurbishment of their home</li> </ul>	<ul style="list-style-type: none"> <li>• Focus groups in CH showed that tenants can have an impact on landlords' decisions and the total energy consumption of the building by working collectively. However, as there is often limited interest in doing so, it is crucial that potential cost savings – identified during the focus groups as an important factor in home energy use – are the focus of information campaigns to motivate tenants to work together.</li> </ul>
<p><b>Minimum Energy Performance Standards (MEPS) / Ban on sale of inefficient products or cars (regulatory measure)</b></p>	<ul style="list-style-type: none"> <li>• Purchase of energy-efficient appliances</li> <li>• Purchase of energy-efficient cars</li> </ul>	<ul style="list-style-type: none"> <li>• Energy efficiency is not a first order buying criteria</li> <li>• Owning a big car is associated with prestige and status</li> <li>• Inefficient cars are still affordable</li> <li>• Higher profit margins for larger cars / sales commission linked to CO<sub>2</sub> emissions</li> <li>• For small or luxury products, energy efficiency is not taken into account</li> </ul>	<ul style="list-style-type: none"> <li>• Minimum Energy Performance Standards (MEPS) prevent manufacturers and retailers from selling appliances that do not comply with certain levels of efficiency, therefore eliminating the least efficient models from the market.</li> <li>• Some focus group participants thought the government should put greater pressure on manufacturers to only produce energy efficient appliances.</li> <li>• Concerning the EU-wide ban on incandescent light bulbs (approved by EU energy ministers in 2008 and coming into force in 2010), the survey results indicate that, on average, participants had very positive attitudes towards purchasing energy efficient light bulbs. However, there was also evidence of limited awareness about the environmental impact of using inefficient light bulbs. We consider these findings to corroborate the EU decision.</li> <li>• CH focus group participants made several references to the Federal Popular Initiative (launched by the Swiss Young Greens to ban big SUVs) of February 2007. Most participants agreed with this initiative, which prevents people from driving SUVs unless they can prove that they have a real reason to. However, others considered this a violation of privacy and demographic ideals.</li> </ul>

## Annex

## IV

# Policy recommendations on Energy Efficient Purchase

## 4.1.1

## Policy recommendations to overcome knowledge-based barriers

Policy recommendations to overcome knowledge-based barriers	
Field of application	Policy recommendations
Energy efficient refurbishment	<ul style="list-style-type: none"> <li>• Developing mandatory home energy performance labels for existing homes that undergo retrofits (e.g. as opposed to a voluntary system as in CH) can help to address the lack of knowledge amongst homeowners. Besides overcoming the general knowledge barrier, this measure would also help addressing the tenant / landlord dilemma, as it would lead to a situation where tenants would demand energy efficiency improvements themselves. Landlords would need to show tenants an energy performance certificate score for their property and therefore would likely face growing pressure from tenants to achieve a higher energy-efficiency rating. With utility bills on the rise, prospective tenants would be more likely to rent a more energy efficient home where they could expect their energy bills to be lower. However, introducing such a label must be accompanied by a huge information campaign to increase consumer awareness of and trust in the label, as the empirical results of this project have shown that labels were perceived negatively by many focus group participants. Information campaigns might work better if they are able to resonate with people as citizens rather than as consumers.</li> <li>• Providing low-cost/ free energy audits to households, e.g. taking the example of a widespread personalized advice service of England with the “Green Doctor Project”, would present an opportunity to provide face-to-face, tailored advice. Considering the potential cost of this instrument, this could happen in combination with a roll out of smart meters.</li> <li>• Engaging with local community action can be a powerful tool to increase consumer awareness. The survey results show that perceived social pressure to reduce energy use is a relatively strong predictor of purchasing energy-efficient light bulbs. This suggests that strengthening social norms on these energy-related topics (e.g. through individuals or groups setting positive examples and/or through governments or NGO’s providing information focused on the societal or group-level benefits of individual behaviour change) is likely to have a positive effect. Findings support the suggestion that actions should be made visible to others to encourage for pro-social behaviour. One option could be to organize competitions between cities or neighbourhoods.</li> </ul>

<p><b>Purchase of energy efficient household appliances</b></p>	<ul style="list-style-type: none"> <li>• Keeping the established, straightforward and easily understood format of a closed A-G label and introducing a regular rescaling to guarantee the effectiveness of the energy label is recommended. "A" is still understood as the best class by consumers and it is argued that proposed additional classes would have very limited impact. It is recommended that the scheme should be rescaled according to the initial scale, ranging from A to G, where D defines the standard energy consumption and A indicates the best products available today on the market. In doing so, a date would also be required to explain the validity of efficiency levels. Changes to the existing label will require a substantial communication effort in order to reduce ambiguity for manufacturers, retailers and consumers (Heinzle and Wüstenhagen, 2009). Although at the time of writing, the European Parliament has approved the new layout of the EU energy efficiency label, introducing additional "plus" classes to the familiar colour scheme, a review of consumer behaviour should take place as soon as possible.</li> <li>• Expanding the energy label to encompass a wider range of products is also suggested, especially for small and luxury appliances, where a significant knowledge gap emerged and consumers currently give little consideration to energy efficiency. An EU energy label for all products would not only be very effective in terms of raising consumers' awareness about the efficiency of currently unlabeled product categories, but would also give incentive to industry to develop and offer more energy efficient appliances.</li> </ul>
<p><b>All</b></p>	<ul style="list-style-type: none"> <li>• Increasing awareness about energy efficiency in schools should help children to acquire knowledge and skills in the field from an early age. Children also often act as "environmental agents" in the home, sharing knowledge and influencing the behaviour of their parents. However, for this to be possible, teacher staff also need to have adequate training and resources on energy efficiency issues.</li> <li>• Making use of popular media and new ways of using media should be explored in order to engage the consumer on energy efficiency issues. In this respect the internet is an important communications channel. One opportunity relates to marketing user-friendly websites which compare products with on their energy efficiency credentials. One prominent example from CH is "Topten" (<a href="http://www.topten.ch">www.topten.ch</a>), which is a voluntary, non-profit and international project working partnership with a range of market players to stimulate demand for the highest-efficiency products. It constantly identifies the top 10 energy-efficient products available across many categories. In addition, we recommend a bottom-up approach is adopted, using a range of communication channels and online tools (e.g. games, social networks, blogs where advice is shared peer-to-peer) to ensure the relevant information is easily accessible to consumers when they want it.</li> <li>• Information campaigns should be more consumer focused and targeted. Existing energy efficiency advice was criticized for being too general, too abstract and too focused on making households feel guilty. For example, personal energy consultation could be made available for free or for a low fee to identify energy efficiency investment potential at the individual household level. Best practice examples include the established energy efficiency advisory boards and offices in municipalities in Sweden, or the French Energy Info Rooms. Establishing and promoting local space where households can source information and advice on energy efficiency could have a significant effect on consumers. Other ideas include: providing specified information online, such as a short video explaining in very simple terms where in a household easy and no/low cost energy efficiency measures could be taken; or having an "online energy saving calculator"; or an information platform along the lines of the above mentioned "topten". In addition, energy meters could be distributed as part of a campaign allowing consumers to measure the energy consumption of appliances and see how much the use of each appliance cost. In the UK, libraries have made energy monitors available to borrow.</li> </ul>

<p>&gt; All</p>	<ul style="list-style-type: none"><li>• Maximise the potential of key windows of opportunity related to lifestyle changes with targeted and timely information. Svane (2002) relates this theory to environmental issues. The principle concept is that in everyday life it is difficult for consumers to change their behaviour and habits, even if people are well informed and are motivated to do so. However, when there are certain fundamental changes in people's lives, they are susceptible to changes in other aspects as well. Potential times when such opportunities arise could be when people move house, workplace or occupation, get married or divorced, have children, or when their children grow up and move out, etc. E.g. new renters should be informed about the energy-efficient use of the appliances in the apartment by the landlord; or parents could be informed about saving energy in magazines, doctors' waiting rooms or while shopping, just to name a few.</li><li>• Exploit communication messages that emphasize the individual benefit of energy efficiency measures.</li></ul>
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## 4.1.2

## Policy recommendations to overcome economic barriers

Policy recommendations to overcome economic barriers	
Field of application	Policy recommendations
<b>Energy efficient refurbishment</b>	<ul style="list-style-type: none"> <li>• In general, although most energy efficiency measures are cost effective within a short period of time, many measures are not realized because of financial barriers. Introducing attractive financing mechanisms so the costs of energy retrofits could also be passed on to new homeowners to guarantee resale market value could be one strategy here. For example, a mandatory small monthly contribution to a refurbishment fund could be established. Another option would be to offer homeowners the chance to install energy saving technologies at no upfront costs and spreading repayments over long periods in parallel with predicted energy bill savings (see the UK is implementing s pilot “Pay-as-you save scheme”). The repayments would therefore be attached to the property and not to the owner. Such a financing mechanism could also help to overcome the barrier facing lower income households that have difficulties accessing credit by the usual means.</li> <li>• Offering special mortgages for refurbishment up to a certain standard, such as Minergie mortgages in Switzerland.</li> </ul>
<b>Purchase of energy efficient household appliances</b>	<ul style="list-style-type: none"> <li>• Introducing promotional programs to enhance the market share of high efficient household appliances. As one of the most important barriers seemed to be that consumers were highly cost-conscious, economic incentives such as subsidies or rebates are highly relevant. Taking the example of a scrappage scheme for vehicles, one recommendation would be to introduce a household appliance scrappage scheme in order to encourage consumers to invest in more energy efficient goods. This would have the advantage that customers would be able to get their old appliance collected and recycled free of charge, overcoming the barrier of reluctance of replacing old appliances leading to a low turnover rate. Another possibility would be to introduce a bonus/malus scheme that would alter the price of products according to their energy efficiency. Consumers who choose a product with poor energy performance would pay an additional amount whereas average products would be considered as neutral. Zero interest loans which are applied in the building sector could also address the initial cost barrier for household appliances faced by households who are having difficulty making the initial investment. Here banks could offer products with zero or low interest rates, which is paid by public authorities.</li> </ul>
<b>Purchase of energy efficient cars</b>	<ul style="list-style-type: none"> <li>• Introducing positive incentives to consumers to use fuel efficient cars in general, and disincentives for buying inefficient cars. Instruments range from introducing a bonus/malus system or scrappage schemes, exemption from import duties and excise duties, to the introduction of laws that highly efficient cars, such as electric or hybrid vehicles can park for free, are exempt for road tolls and can use public transport lanes. Various fiscal incentives and subsidies are already in place in different countries (see the examples in the Annex). However, here potential impacts on low income groups should be considered within the design of such instruments.</li> </ul>

### 4.1.3 Policy recommendations to overcome physical and structural barriers

Policy recommendations to overcome physical-structural barriers	
Field of application	Policy recommendations
<b>Energy efficient refurbishment</b>	<ul style="list-style-type: none"> <li>• Addressing the skills gap of relevant professionals and artisans in the field of energy efficient refurbishment with strong and educational support. There is clearly a gap between the infrastructure requirements in the future and the work force capacity of the present. In this case, an introduction of a refurbishment manager profession would make sense. Also ensuring knowledge of local planning authorities through constant training should be carried out.</li> <li>• Overcome tenant / landlord dilemma by providing incentives to landlords, such as lower rates on taxes on the rental income of landlords. Another option would be to require standard insulation measures to be a condition of renting out a property.</li> </ul>
<b>Purchase of energy efficient household appliances</b>	<ul style="list-style-type: none"> <li>• Rewarding retail for importing and selling energy efficient appliances and educating sales staff about the topic of energy efficiency. However, top level management should also be targeted when implementing energy efficiency training, due to lower staff turnover compared with sales staff and by involving top management conveys the message that energy efficiency is part of the wider company strategy. Another option would be to introduce special incentive programs for retailers, such as providing an annual award for the most innovative energy efficiency information program. Also establishing a retailer's tax incentive program to reward retail that reach benchmarks in the sale of efficient products could be established, where the emission intensity of the total sales of competing retail chains would be measured.</li> </ul>





## Annex

## V

# Examples of measures for changing to sustainable energy sources

This section of the Annex presents a wide range of potential measures that have, or could be, adopted to encourage a move towards sustainable energy sources. These do not represent recommendations, as such, but aim to give a comprehensive overview of tools and initiatives suggested by stakeholders and consumers in the empirical research.

## 5.1

### Domestic Energy Use

#### 3.1.1

#### Buying green energy

##### — control and regulatory instruments

Regulatory measures, and therefore the role of policy makers, emerged as the most important instruments in encouraging consumers to buy green energy. Policy makers should set the boundaries within which suppliers can act as competitive market players. At the same time energy suppliers should provide transparent information about the origin of the supply. This should be supported by, for example, a mandatory labelling system to improve consumer understanding of where their energy comes from and the benefits of green power. In ensuring clarity and consistency in information provided, the credibility and perceived ecological value of green power may be enhanced.

##### — economic and market based instruments

In the context of economic instruments, the differentiation between peak and off peak electricity prices is highly relevant: peak-time electricity should be more expensive than off-peak. Similarly, the unit price of energy from traditional sources should be greater than green energy.

Furthermore, the energy mix in all countries should incorporate green sources as standard, thus increasing consumption. Electricity utilities could also be required to explicitly offer a choice of different energy products to consumers.

##### — fiscal instruments and incentives

Reference was made to both increased governmental support and the introduction of feed-in tariffs as fiscal instruments to increase the usage of green energy.

## — support, information and voluntary action

The added value of green power needs to be communicated. Besides a clear labelling system discussed above, potential measures include: visitor open days of green power plants; articles in consumer magazines; descriptions of the certification process; provision of transparent and comprehensive costing of power production.

Several electricity utilities have planned and implemented successful marketing strategies. However, marketing approaches should be better targeted at specific consumer groups and present green power as both fashionable and practical. To ensure effective marketing, progress is needed in identifying the most likely consumers to adopt green energy, for example, the educated middle class are generally perceived to be more aware of environmental issues and able to afford green power.

It is also important to ensure the concept of green power is as close to the customer as possible. Green power should be made more visible.

Best practice examples are important motivators, therefore public buildings should be encouraged to use, and demonstrate the use of, green energy.

Finally, more information about green energy technology, and the costs and benefits of installing it would also increase awareness and motivation.

### 5.1.2

#### Construction of low energy houses

## — control and regulatory instruments

As a control and regulatory instrument, increasing the required level for sustainability in new housing should be accompanied by improved monitoring and enforcement of design and construction standards. The NO example suggests that the introduction of energy labelling of houses may be a highly beneficial solution.

## — economic and market based instruments

In terms of attempts to improve cost transparency, life-cycle cost calculations need to be carried out more frequently. Currently, they tend to be conducted more with investment property developments and rarely with individual privately-owned homes.

There is also a need for the construction industry to work more closely with other sectors, particularly with planners and with its supply chains.

## — fiscal instruments and incentives

Companies should be provided with support when building new offices utilising environmentally friendly solutions. This would increase demand for these technologies and also set a good example.

The demand for new technologies may be increased by decreasing the VAT rating of relevant services and products.

Special mortgages and loans should be available for building low energy houses.

Ensuring availability and awareness of financial support from the government would

also help promote the construction of energy efficient buildings. Subsidies should consistently be available, in sufficient quantity and for the long-term, to anyone wishing to develop low energy housing.

### — support, information and voluntary action

The topic of low-energy housing needs to be officially integrated into education and training programs. This applies to vocational schools, universities, and technical colleges.

It is important to improve cost transparency and make higher initial investments seem worthwhile. A new standard should be developed that shows not only initial investment costs, but also the costs of using and living in the house (i.e. life-cycle costs).

Websites and other services should be developed to ensure consumers have easy access to reliable information in finding appropriate professionals for installation works.

Energy efficiency and life-cycle cost issues need to frequently be in the public domain. The media could make a valuable contribution to promoting energy efficient buildings with feature articles on low-energy housing, making reference to all players involved (from designers and architects to planners and installers), with emphasis on energy efficiency over aesthetics, thus presenting an holistic view of energy efficient developments.'

## 5.1.3

### Installation of photovoltaic panels

#### — control and regulatory instruments

As noted above, stakeholders made reference to the need for regulatory enforcement and financial backing to support businesses in developing environmentally friendly solutions for new office buildings.

Construction permits were identified as a potential barrier to PV installation, thus there is scope for these to be relaxed. This would convey a message of government support of PV and reduces the burden on the consumer in seeking necessary planning permission.

Progression in city planning could also help promote photovoltaic panels. Strategies could include: 'zoning' to mandate an East to West roof pitch in all new developments thus ensuring future opportunities for solar panels; regulating tree planting (ensuring trees do not block sunlight to potential PV installations); and 'solar communities', in which planning considerations may be relaxed on the basis of PV being installed.

Alternatively, the onus for PV installations could be placed on the utilities rather than the individual householder, for example, by mandating a minimum percentage of total power generation from solar installations.

#### — economic and market based instruments

Manufacturers and developers should work together to ensure building-integrated PV solutions become increasingly mainstream, whilst at the same time addressing issues associated with aesthetics.

Some electricity companies have signed long term contracts with solar power producers that guarantee payment for the power generated. These contracts help to create a sense of security for the owners of PV systems.

## — fiscal instruments and incentives

In Germany, the feed-in tariff has proved to be a very effective way of supporting and stimulating the solar power market. The tariffs are production-oriented and financed by the power consumers rather than public funds. A production-oriented approach is important to promote installations of high quality.

Long-term price reduction of PV installations is possible with government support to: 1) stimulate the market (e.g. through subsidies or tax incentives), thereby increasing demand and enabling economies of scale in production; and 2) funding R&D to further technological advancement and the development of lower cost solutions.

Opportunity to spread the initial costs of investments over time could also help in overcoming the identified financial barrier to uptake. Banks could offer attractive loans to contracting companies and private investors. Solar power systems are considered low risk investments in terms of reliability and lifespan (over 20 years).

## — support, information and voluntary action

Awareness raising and the provision of accurate, reliable information is the most important action needed. The creation of a market for photovoltaic panels requires better communication, therefore regular and targeted information campaigns are necessary.

Future marketing efforts could usefully aim to identify particular target groups. Image-based campaigns might be needed to demonstrate that PV is a 'fashionable' product.

Training and education of architects and installers is also very much needed to ensure they have a sound understanding of photovoltaic systems.

## 5.2

### Transportation

#### — economic and market based instruments

Policy / measure	Stakeholders
Increase range of electrical cars	Manufacturers
Address concerns over lack of safety and space in electric cars	Manufacturers
Increase number of stations where batteries can be recharged	Government/ Manufacturers
Increase capacity on batteries	Manufacturers
Provide advantages for electric cars over petroleum vehicles, such as electric car only zones/days in certain areas, free parking, access to bus lanes.	Government / Municipalities

Provide cheap "city-bicycles" in all big cities	Municipalities
Build larger parking lots near suburban train stations to encourage and make possible more commuting by trains	Municipalities/ train companies
A need for technology innovation, on a broad scale, to ensure low-emission/ fuel efficient/ green fuel/ electric cars become mainstream; Build on the experiences from France in relation to technological development in bio-fuels.	Government
Oil companies are in a position to continue the development of biodiesel and ethanol, but are dependent upon government support to do so. Government support is also necessary for the crucial development of infrastructure for alternative cars - administrative and structural support that will influence the price of alternative fuel for cars. There is also an economic and political barrier linked to the development of ethanol input in gasoline production in NO: at present ethanol is taxed as alcohol making it too expensive for the competitive market.	Government
In NO, most cars are compatible with B5 and E5, but a knowledge barrier exists preventing take-up: consumers need to understand the potential benefits of bio-fuel; that it doesn't damage the engine nor decrease engine efficiency. Information campaigns can address this knowledge gap. However, eliminating concerns about the impact of growing biofuels on food production presents an additional challenge. The development of new generation bio-fuels may help alleviate these concerns, but this relies on effective communication with consumers.	Government agencies & relevant NGOs.

— fiscal instruments and incentives

Policy / measure	Stakeholders
Interest-free government loans could be better than grants for covering part of the investment costs related to electric cars	Government
Grants for replacing petrol cars with electric cars	Government

— support, information and voluntary action

Policy / measure	Stakeholders
There is evidence to suggest that people view electric cars more positively after having experienced them for themselves (NO). Thus there is potential for collaborative efforts between producers of electric cars and the appropriate government bodies to ensure such opportunities exist, at suitable venues.	Government/ Manufacturers

## Annex

## VI

# Policy recommendations for changing to Sustainable Energy Sources

## 6.1.1 Policy recommendations to overcome economic barriers

Policy recommendations to overcome economic barriers	
Field of application	Policy recommendations
<b>Installation of Photovoltaic Panels</b>	<p>Some electric utilities have signed long term contracts with solar power producers that guarantee payment for the solar power generated. These contracts help to create a sense of security for the owners of PV systems.</p> <p>Banks should offer attractive loans to contracting companies and private investors. PV systems are considered low risk investments since they are reliable and have a minimum lifespan of over 20 years.</p> <p>The cost barrier could be overcome with an effective PV policy. Fixing a cap on the feed-in tariff is seen as a clear political failure by nine out of ten stakeholders.</p>
<b>Buying green energy</b>	<p>Peak-time and standard electricity should be more expensive than off-peak, green energy, therefore encouraging a shift to green energy.</p> <p>Introduction of a feed-in tariff to encourage greater uptake of renewable energy amongst the general public must herald greater government intervention and financial support in this area.</p> <p>Governmental support is needed for the usage (installation) of green energy appliances, such as PV systems</p> <p>Communicating added value: The added value of green power needs to be communicated more clearly. Besides a labelling system, opportunities for communicating the added value include: 'open house' 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 comprehensive and transparent calculation of all the costs of the power.</p>
<b>Construction of low Energy Houses</b>	<p>It is important that the governmental support allows for long term planning, meaning subsidies should be guaranteed for multiple years.</p> <p>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 experience.</p>

## 6.1.2 Policy recommendations to overcome political barriers

Policy recommendations to overcome political barriers	
Field of application	Policy recommendations
<b>Installation of Photovoltaic Panels</b>	<p>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 put off by the bureaucracy involved in obtaining a permit.</p> <p>The law could state that all new homes must include a certain amount of renewable energy.</p> <p>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.</p> <p>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 from renewable sources.</p> <p>The feed-in tariff has proven to be an effective way of supporting the PV market. Feed-in tariffs are efficient because they are production-oriented and are financed by the power consumers rather than via public funds. (However, the implications of this approach for consumer bills need to be considered).</p> <p>The level of support should be above the VAT rate for the purchase of RES technology, such as solar panels. Stakeholders commented that the “well developed” black market in HU can only be rolled back if the support level is over the level of VAT (25% in HU), otherwise people would not achieve any financial benefit from claiming the state subsidy.</p>
<b>Buying green energy</b>	Introduction of a feed-in-tariff and quota obligation for green power
<b>Construction of low Energy Houses</b>	<p>Increased levels of sustainability in new housing should be accompanied by a higher level of monitoring and enforcement of design and construction standards.</p> <p>Decrease VAT of relevant services and products; Provide non-refundable support.</p> <p>Municipalities could play a key role, as they may implement policy objectives, like reduced emissions of climate gases, or reduced costs, or both. In addition, they are often involved in energy production as well.</p>

### 6.1.3 Policy recommendations to overcome knowledge based barriers

Policy recommendations to overcome knowledge based barriers	
Field of application	Policy recommendations
<b>Installation of Photovoltaic Panels</b>	<p>Awareness raising and distributing accurate information: The creation of a market for PV requires better communication (especially awareness campaigns). Regular and targeted information campaigns are necessary.</p> <p>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.</p>
<b>Buying green energy</b>	<p>The yearly electricity bill sent to consumers should include a declaration of the origin (electricity source and whether it is produced domestically or abroad) of the electricity.</p> <p>Educate the public: consumers expressed a general lack of awareness and suggested that a much greater effort must be made to educate the public about alternative energy sources, and to make them aware of existing programs</p> <p>More information about the green energy technology, and the costs and the benefits of installing it</p>
<b>Construction of low Energy Houses</b>	<p>In terms of attempts to improve cost transparency, life-cycle cost calculations are done in some cases, but are still much too seldom. They are more often carried out for investment income properties and rarely for individual privately-owned homes.</p> <p>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, so efforts need to be focussed particularly on them.</p> <p>In order to ease the search for the right professionals (artisans, etc) a website should be created by governmental offices where "professional partners" (people with the appropriate training) could be found.</p> <p>The media could make a valuable contribution to the promotion of energy efficient buildings with feature articles on low-energy housing and presenting them in a positive light.</p>

#### 6.1.4 Policy recommendations to overcome physical and structural barriers

Policy recommendations to overcome physical and structural barriers	
Field of application	Policy recommendations
<b>Installation of Photovoltaic Panels</b>	<p>City planning could promote PV in several ways. Zoning codes could mandate that in all new developments the roof pitch should run from East to West to make them ideal for solar panels.</p> <p>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 if you install a PV system.</p>
<b>Buying green energy</b>	<p>An accreditation scheme that ensures purchasing green electricity provides additional capacity.</p> <p>Producers should provide transparent information about the origin of energy provided</p> <p>Energy suppliers should make it possible to choose energy products: All electric utilities should offer consumers several different energy products to choose from. People can be pushed to make the right choice.</p>
<b>Construction of low Energy Houses</b>	<p>There is a need for the construction industry to work more closely in cooperation with other sectors – particularly in working with planners and its supply chains.</p>

### 6.1.5 Policy recommendations to overcome cultural barriers

Policy recommendations to overcome cultural barriers	
Field of application	Policy recommendations
<b>Installation of Photovoltaic Panels</b>	<p>Businesses should work together to produce building components so that people do not think about solar panels separately but instead it is integrated in the design of the house. 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.</p> <p>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. Colours and models need to be available that better integrate with roofs.</p>
<b>Buying green energy</b>	<p>There needs to be more credible and transparent information from the government on the importance of developing a more varied energy mix to address peak oil and climate change, including renewable energy</p> <p>Governments can counter the wait-and-see attitude by raising awareness and spreading accurate information. Schools, the media, solar industry associations and construction industry fairs could play an important role</p>
<b>Construction of low Energy Houses</b>	<p>Construction companies and architects need to develop skills and obtain knowledge in order to address the skills gap.</p>



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