

Municipal Support-Options for Energy Sufficiency by the Formation of Framework Conditions

A Mixed Methods Analysis of the Electricity Tariff KlimaFix by
Stadtwerke Heidelberg

Master Thesis in Socio-Ecological Economics and Policy

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I dedicate this thesis to the memory of my father Günter Leuser, who died in a tragic accident this year. I want to thank him for all the support, his trust in me and that he gave me the freedom to grow to the person I am today throughout all his life.

Credits

I want to thank Markus Duscha for all his support, ideas, comments and advices that guided me throughout the work on my thesis, and Lars Brischke for giving me the opportunity to write my master thesis within the research project, his ideas and inspiration.

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Abstract

In this study the question of how and to what extent services provided by municipal institutions can induce changes in consumption patterns of individuals to decrease energy demand through the provision of options and changes of framework conditions shall be addressed. The motivation is to explore policy options supporting energy sufficient practices, as there is increasing evidence that the technological strategies of efficiency and consistency are insufficient to substantially decrease energy demand of households. Therefore, innovative policy approaches for a sufficiency strategy shall be explored in order to supplement the former two for a comprehensive sustainability transition.

The research project is conducted from the interdisciplinary perspective of social ecological economics. The literature review takes into account contributions from various disciplines on the issues of sufficiency, the recent discussion on policy approaches and interventions for energy conservation in households. Section 2 includes a mixed methods case study on the electricity tariff KlimaFix provided by the local utility company in the city of Heidelberg. Customers of the tariff receive a premium of 15€ when reducing their electricity consumption by 15 percent compared to the previous year.

A mixed methods approach is applied for the evaluation of the impacts of this innovative premium scheme and to develop further improvements. Firstly, electric energy consumption data of customers of the tariff and a comparison group was evaluated to gain insights on the demand reduction, consumption patterns and consumer groups. Secondly, 12 problem-centered interviews with customers were carried out to explore the perception of the premium and to gain further insights on potential explanations for quantitative results and options for modifications of the premium scheme. Thirdly, three Expert interviews were carried out to explore the motivation of the company in offering the tariff, further potential interventions and the institutional framework.

Although premium receivers on average sustained the achieved consumption reduction, overall no significant effects of the premium were found. A possible explanation is that premiums were probably received in many cases unwittingly as interview partners did not know the premium and even after being informed about the scheme were not interested in participating.

An important limitation of the study is the rebound effect due to savings and the premium that cannot be investigated. The exploration of innovative legislative measures in the emerging area of sufficiency policy is an important contribution for prospective policy strategies and research. The case study is part of the larger research project “Energy Sufficiency”, carried out by the Institute for Energy and Environmental Research Heidelberg (IFEU) in cooperation with other research institutions financed by the Federal Government of Germany, Federal Ministry of Education and Research (BMBF).

Keywords: Social Ecological Economics, Sufficiency, Policy, Energy Conservation, Behavioral Changes, Electricity Tariff, Monetary Incentive, Mixed Methods

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1 Introduction

The Master Thesis is structured as follows. For the framing of the topic a short introduction that shows the motivation for the thesis and the research subject is given in this section. In the second section the theoretical framework of sufficiency theory and related issues such as policy design are presented. Additionally, insights from an expert interview with Uwe Schneidewind, president of the Wuppertal Institute for Climate, Environment and Energy, are included in this section. The third Section discusses the state of the art in regard to the empirical research, with the methodology and the research process presented in the fourth section. In the fifth section, the results of the empirical research project and the expert interviews are presented. These results are then being discussed and linked to the literature in section six. Finally, in the conclusion the insights are briefly summarized with some limitations and constraints, an outlook on possible implications of the outcomes and recommendations for further research.

1.1 The Multiple Environmental Crises

On a global scale as in many local phenomena there is ever-growing evidence of the adverse impacts on the environment and resource depletion caused by human societies and the dominant economic system. For the most prominent environmental crises, climate change, the reports by the Intergovernmental Panel on Climate Change (IPCC) present increased confidence that the causes are anthropogenically produced greenhouse gas emissions (GHGs) (Bernstein et al., 2008). While the Club of Rome already warned in 1972 that societies will face severe problems when

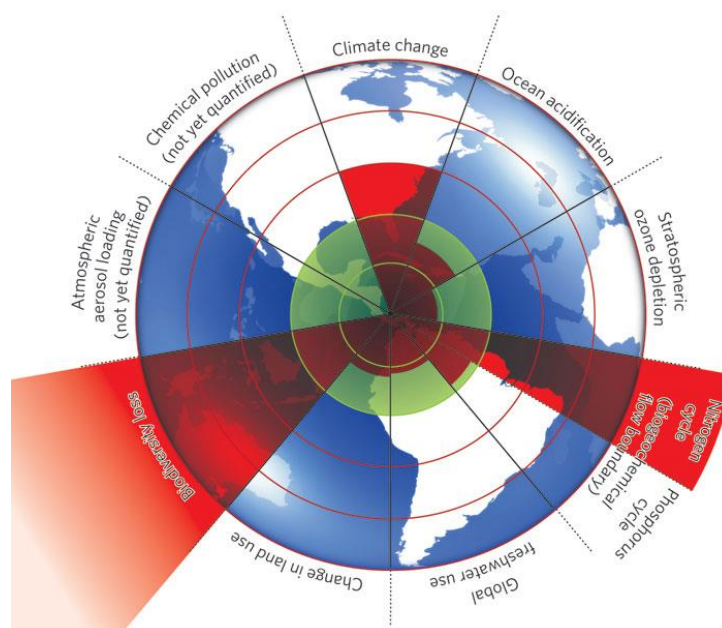


Figure 1 Planetary boundaries (source: (Rockström et al. 2009))

following the growth trajectory endlessly. Following this trajectory the past forty years, today these challenges become more and more obvious (Club of Rome, 1972). (Rockström et al., 2009) show that humanity not only faces the challenge of climate change, but has or is about to trespass further planetary boundaries with the impacts not only affecting human societies but eco-systems all over the world. Human interference with the environment has resulted in high rates of species extinction and the reduced availability of ecosystem services that are vital for human survival (World Resources Institute, 2005). Furthermore, resources are depleted with an ever increasing pace (Bardi, 2014), leading to scarcity and production peaks with peak oil forecast in the near future (International Energy Agency, 2013). These environmental crises are coinciding with social and economic crises including phenomena such as rising inequality and unemployment. These tendencies and crises are interconnected and reinforcing each other.

1.2 Current policy approaches and their limitations

To mitigate and tackle the multiple ecological crises, current policy approaches comprise of the technological strategies of consistency and efficiency. Consistency refers to the invention of new products that are neutral in their impact on the environment and resource deposits. While there might be some success with single innovations, it seems, however, that much more time would be needed for these inventions to be ready for the market and mass production. But time is the variable that is most important according to current exacerbating crisis trends (Linz, 2002).

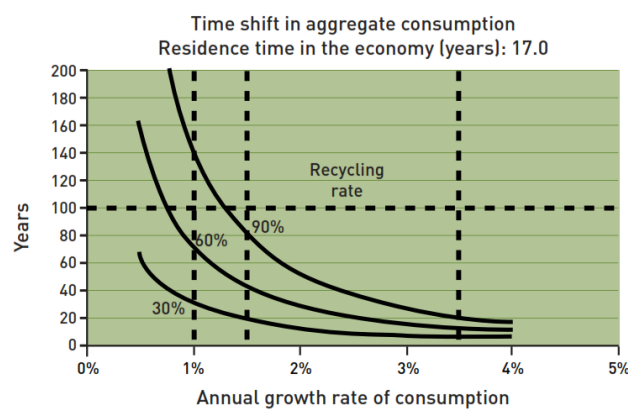


Figure 2: The effects of increased efficiency in recycling processes on resource depletion depending on the rate of consumption growth (Grosse 2010).

The efficiency strategy aims to improve current processes in a way that reduces the overall resource consumption and thereby also reduces the damage to the environment through technological improvements of these processes. While legislation in the European Union (EU) established very ambitious targets for efficiency increases (European Union: European

Commission, 2008), it is questionable whether improvements are sufficient and the fast and significant development that would be required is even achievable (Jackson, 2011). For example, while yearly efficiency increases of 0.7 percent were achieved globally, population and welfare growth overcompensated for these achievements and resulted in a 40 percent increase in carbon-dioxide emissions (Jackson in (Stengel, 2011)). The limitations of a sustainability strategy by solely focusing on efficiency are obviously illustrated in Figure 1. The diagram shows the diminishing effect on the depletion of resources (here given in years of resource availability) achieved by efficiency increases, in this case of recycling processes, with increasing consumption (Grosse, 2010). This may explain why efficiency measures have only managed to slow down the increase in demand, but have not brought about the durable demand reduction in energy consumption that is needed (Darby, 2007). This phenomena – the rebound effect - is more and more thoroughly investigated lately (Barker et al., 2009; Madlener and Alcott, 2009; Sorrell et al., 2007). This is why an additional sufficiency strategy is required to complement the efficiency and consistency approach. Social ecological economics - with its interdisciplinary approach and the framework of nested systems with the economy based on the society which is supported by the biosphere

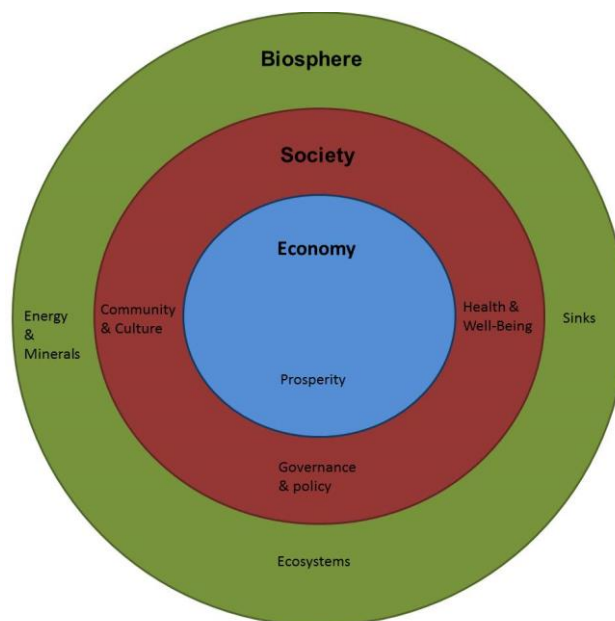


Figure 3 The nested systems of sustainability in the perspective of socio-ecological economics (adapted from: (Constanza et al. 2001))

(illustrated in Figure 3 and (Constanza et al., 2001; Gowdy, 2005) for a more in depth description) – is therefore helpful to investigate new measures and strategies that involve cultural, societal, environmental and economic considerations.

In contrast to efficiency, which focuses on relative measures such as the maximum output that can be obtained with the least energy input, sufficiency focuses on absolute measures, which is required when considering the current trends. In the larger research project of which this thesis is part of the focus is on energy consumption and related practices of private households. Electric energy consumption of German households increased by 19% between 1990 and 2011 in contrast to increases in efficiency (see chapter 3). That is why energy sufficiency shall be investigated in the research project as a measure to limit or reduce energy consumption.

Recently, trends towards sufficiency on the individual level are increasingly recognized as well by the public (Brauck and Hawranek, 2014) as by academia (Alexander and Ussher, 2012; Datamonitor, 2003; Elgin, 2013; Schreurs et al., 2013) and growing interest in small communities such as transition town groups can be observed. However, these are still marginal groups within the society. But even for these it is difficult and requires great strength and will to adopt sufficiency lifestyles due to current incentive structures, institutional settings and infrastructures that still favor energy intensive lifestyles. That is why policies for (energy) sufficiency are required that aim at changes in these framework conditions, in which everyday practices take place.

1.3 The Research Project and Research Question

The *Einsparbonus* of the Stadtwerke Heidelberg could be one element of such an adjustment in the framework conditions of electric energy demand. The purpose of this study is to investigate this premium from the perspective of social ecological economics. The question is whether the *Einsparbonus* in the electricity tariff KlimaFix by the local utility company Stadtwerke Heidelberg stimulated customers to change their consumption patterns towards more sufficient behavior. Customers of the tariff receive a premium of 15€ if they reduce their electricity consumption by 15 percent compared to the previous year. In the outlined state of the art below this kind of incentive is a consequence intervention, as the influence by the incentive is effective after the action (saving behavior or not) took place. Measures such as the innovative tariff design could be part of a sufficiency strategy with policy options that facilitate and enable individuals towards more sufficient ways of life.

The research questions that are investigated are:

- (1) Did the *Einsparbonus* within the KlimaFix tariff of Stadtwerke Heidelberg lead to significant energy conservation in the households of customers?

- (2) Is a monetary incentive such as the *Einsparbonus* an appropriate measure within a strategy for energy sufficiency?

In order to explore this question a mixed methods approach was carried out to explore the effects of the premium broadly because no study was found investigating monetary incentives outside an experimental research design. To find possible explanations for the outcomes of the quantitative analysis triangulation is an appropriate method to gain deeper insights in such an exploratory study.

The research project is split into two major sections. The first section (chapter one and two) contains a literature review on sufficiency, the recent discussion on policy approaches and interventions to facilitate and encourage energy conservation were reviewed and analyzed. Thereby, the empirical research is put into context of the theoretical discussion.

The second section is the mixed methods case study on the electricity tariff KlimaFix provided by the local utility company in the city of Heidelberg. The mixed methods approach is proposed in order to investigate the impacts of this new tariff and evaluate it for further improvements. Consumption data obtained from the utility company were evaluated to gain insights on the demand reduction, consumption patterns (i.e. the fraction of consumers who received premiums in subsequent years) and consumer groups (i.e. the fraction of consumers with above-average demand). Problem-centered interviews with customers were carried out to explore the perception of the premium and potential alternatives by customers, measures with which it was tried to receive the premium but also potential problems of the premium. Expert interviews with the CEO of the company, a local politician and an employee of the municipality of Frankfurt were carried out to explore the motivation of the company in offering the tariff, the political framework and experiences in another municipality with a similar premium scheme.

In the discussion results of the evaluation are linked to the literature reviewed and a framework for adjustments for sufficiency is outlined based on the literature reviewed and the empirical research carried out, taking into account the multi-level governance structure of the EU.

2 Theoretical Framework

Above it was shown and emphasized that sufficiency is a necessary third pillar to tackle the multiple environmental crises and resource depletion. With the focus on absolute (extensive) measures it is also important from the view of global justice. However, while it seems obvious when observing current trends that sufficiency is a necessary part of a strategy to meet the challenge, there is a long ongoing discussion about how sufficiency could actually be defined. (Reichel et al., 2009, p.8) stated that “there is no single definition for sufficiency”. In the following the most important lines of arguments are briefly introduced before summarizing the definition of energy sufficiency elaborated in the project. The chapter ends with a brief summary of new developments with regard to sufficiency policy and criticism that is voiced against sufficiency approaches.

2.1 Concepts of Sufficiency

A growing number of researchers are exploring concepts of sufficiency as a third pillar of sustainability due to the reasons outlined above. A range of definitions of sufficiency are found in the literature on sustainability. Generally, the strategy aims at a decommodification adopted on a voluntary basis by individuals (Stengel, 2011). The origins of the word is the Latin word *sufficere*, that can be translated into “being enough”, “suffice”, or, “being capable” (Linz, 2013a), other terms are “enoughness” or “too muchness”(Princen, 2005). For (Schneidewind, 2013), sufficiency refers to an exploration of how a conscious and restrained handling of wishes could look like. These wishes or preferences, their source, development and the question of reasonable scales, are important societal questions particularly on the interface of the social, ecological, and, economic sphere. However, these issues are still widely ignored in traditional economics. In the following the literature on sufficiency is summarized dividing it into two major approaches. First, the holistic one, which is more focused on lifestyles, norms and values in society, while the second, more ‘quantitative’ one revolves around the recognition of physical limits and ecological constraints. While the starting points may be different, both fields have in common the critique of materialistic lifestyles and norms in current societies and the current economic system with its need of and aim at an ever-growing resource consumption.

2.1.1 Holistic Approaches

Sufficiency as a Matter of Norms and Values

In general, both types of concepts arise from ecological concerns but the holistic ones are more far-reaching, but mostly less concrete. The focus is placed on *a fundamental* change in thinking, perceived to be as required as overdue, and related perceptions of welfare, values and norms (Linz 2013; Princen, 2005; Dürr et al., 2005). Often philosophical considerations are included, such as issues of contemporary philosophy of science and notions of ‘a good life’. Other authors refer commonly to the values of modesty, humility or frugality when defining sufficiency (Huber, 1994; Luks, 2002; Müller, 2009).

Thomas Princen defined sufficiency as “an idea, a principle, indeed an ethic for sustainability” that is opposed to efficiency thinking, trying to maximize short-term benefits. In contrast, thinking and acting sufficiently would comprise restraint and respite. Princen claims that “such principles are consistent with a world that is ultimately unknowable and uncontrollable, a world where cause-and-effect relationships are deeply problematic, a world where limited predictability, system surprise, threshold, and synergistic effects are the norm, not the exception” (Princen, 2005).

Sufficiency as a Lifestyle

This concept is linked with the concept of voluntary simplicity that aims at a shift in values and norms away from commodities, towards activities with lower material intensity such as arts, music, philosophy and artisan work (Elgin and Mitchell, 1977; Schumacher, 1989; Alexander 2013). This is why sufficiency is also often defined as a change of lifestyles as for example by (Kleinhüchelkotten, 2005). In this context sufficiency is often referred to as to describe the good life. However, the term ‘good life’ provokes many critics emphasizing the conflict with modern liberalism. It is disputed whether this notion of a ‘good life’ is applicable to a contemporary scientific discussion as in philosophy the quest for it was abandoned after the Age of Enlightenment. Nevertheless, a recent collection of essays revived the discussion on the question what a good life could mean in contemporary societies (Steinfath, 1998).

2.1.2 Eco-Sufficiency

The starting point for advocates of eco-sufficiency is an observed overconsumption of the earth’s resources and overuse of waste deposits. Linked with the concepts of planetary boundaries (Rockström et al., 2009) and global social equity, it is argued that industrial societies need to drastically reduce their environmental impact and related overall material and energy

consumption. To address these environmental and social crisis tendencies advocates of eco-sufficiency doubt that technological solutions could be the panacea. Researchers from different fields come to the conclusion that resource- or energy efficiency are not sufficient. Instead, because of the recognized need of a reduction of resource use, it is argued that consumption levels in industrial societies need to decrease. Concepts such as energy consumption sufficiency with the 2000-Watt-Society (see Energy Sufficiency below) and ecological footprint, giving every human a usable area of 2.7 hectares (Rees, 1996)(Wackernagel and Yount, 1998) are representative for these approaches. This shows the focus on measurements and defined figures of a “safe range” over the related qualitative or philosophical questions. This is why many authors refer to sufficiency as a consumption reduction and a measure for the absolute decrease of resource demand (Brischke and Thomas, 2014, 2014; Muraca, 2010; Sachs, 1997).

The issue with both approaches, most for the holistic ones, is their normative and moral nature. Beyond basic needs and an upper threshold (not everyone can have the right to a space flight) it is difficult to come to a general agreed definition of how much is enough and how much is too much.

Independently from the various starting points – whether the focus is on the environment, the norms and values or considerations about time (Paech, 2010; Rosa, 2005) – and streams of theory, the common ground of all sufficiency strategies is the questioning of the own wants (in contrast to basic needs). “Do we need consumption goods, services, technical features at all and if to which extent do we need these?” (Brischke and Spengler, 2011, p. 87) This means a focus on the true needs and the examination of reputed needs for shrinking options (Stengel, 2013a). This view is again different from the question of “enough”, which is more focused on the external circumstances and scarcities. Nevertheless it is fundamental for individuals also to question of needs: “What do I really need?” (Bosshart, 2011, p. 83). In a society, in which needs are created through advertisement to satisfy industrial production, in which not the economy serves the needs of citizens, but, in contrast, society presumably has to adjust to the economies demands (Fromm, 1976; Galbraith and Crook, 1958), this is a fundamental question, which probably goes beyond the capacity of most individuals during their daily lives. (Max-Neef et al., 1991) therefore developed the theory of a needs matrix to define basic needs and how these can be met. In his theory satisfiers can be classified as pseudo-, inhibiting, single and synergetic satisfiers, with the latter two being the one that should be fostered and supported.

A recent approach to sufficiency was taken by (Winterfeld, 2011) demanding a right for sufficiency that protect or free individuals from the compulsion to consume more and more. Many of all

these approaches are often qualified to be reputedly normative, which could be partly caused by the fact that in the dominant economic theory preferences are assumed to be given and stable. Moreover, it is often overseen, that likewise the dominant focus on technological strategies could be classified to be a normative one, caused by the mechanistic-reductionist ontology and the hegemony of the ideology of economic growth.

Apart from these questions (Fischer et al., 2013) (p.10) tried to find a new, more neutral definition that takes into account the various approaches and their difficulties while still defining it in a way that sharply distinguishes it from consistency and efficiency:

“Sufficiency is a change in consumption patterns that help to stay within the carrying capacity of the planet. This change implies a modification of the utility aspects of consumption.”

The notion of utility aspects is crucial as it shows that the consumption of a good or service always implies a whole range of these aspects. To explain this concept more clearly the authors compare a bicycle and a car. While both satisfy the primary need of mobility, the use of a car obviously is less exhausting and faster, while the use of a bicycle is beneficial for the health and saves the frustration of searching for a parking space. The changes in consumptions patterns range in their impacts and perceived restriction to various degrees as shown in Table 1.

Table 1 Sufficiency levels on the basis of depth of engagement. Adapted from: (Fischer et al. 2013)

<i>Sufficiency Level</i>	<i>Perceived restriction / Input</i>	<i>Type of Change in Consumption Patterns</i>	<i>Example</i>
S1	No – Little	i.e. smaller device	Refrigerator with 3-star compartment (101 l / 17 l), instead of a fridge-freezer unit (101 l / 41 l)
S2	Middle	i.e. device with less comfort	Only refrigerator without freeze function
S3	Strong	i.e. time consuming behavioral changes	Not using the refrigerator for 4 months a year, cool food on the balcony or by the window
S4	Very Strong	i.e. renunciation of the device, complete change in practices	No refrigerator, instead buy food more frequently or longer-lasting foods (canned or preserved)

2.2 Energy sufficiency

Only a small body of literature exists on energy sufficiency. Darby distinguishes between carbon sufficiency, energy consumption sufficiency, energy service sufficiency with the overall concept of ecological sufficiency. The latter comprises all impacts on the environment caused by human societies (Darby, 2007). Energy consumption sufficiency comprises concepts that include a maximum amount of primary energy consumed per capita. (Brischke, 2013) states, that

sustainable energy systems can only be achieved through a global limit on absolute energy demand as all technologies used today for energy provision have environmental impacts and involve high demand for resources. For example Germany, the EU and the World Future Council set a target of 2000 Watts per capita to be sufficient (World Future Council, 2009). The enormous potential of energy sufficient behavior is shown by (Vosse, 2014) with a maximum of a reduction of about 80 % by fully exhausting efficiency and sufficiency potentials jointly. Energy service sufficiency aims to reduce household demand to a certain level of kilowatt-hours while ensuring residents are content with the level of service. For Darby this means setting a minimum standard for services and for the employed technology. Additionally, it implies the definition of a maximum permissible environmental impact (Darby, 2007). The concept appears focused on efficiency, nevertheless, it could certainly also imply questions such as of a sufficient level space heating, hot water, and electricity consumption. These thresholds would be set after a democratic discussion and decision making according to the author. A recent example of energy demand reduction without technological solutions applied is the case of Setsuden. While (Luhmann, 2012) defines the Setsuden campaign with its enormous conservation success in post-Fukushima Japan to be not a sufficiency one, (Stengel, 2013a) in contrast explicitly refers to it as an example showing the potential of energy sufficient lifestyles.

2.2.1 Definition in the Research Project

Within the research project “Energy Sufficiency – Strategies and Instruments for a technological, systemic and cultural Transformation towards a Limitation of Energy Demand in the Consumption Sector Construction and Living” (Brischke and Thomas, 2014) elaborated a definition of energy sufficiency. The aim of energy sufficiency is to limit and reduce the input of technically deployable energy towards a sustainable level. It has to be in line with the requirements of sustainable development that means for example it has to take into account the complete resource input, effects of temporal and spatial shifts and ecological and social impacts. This holistic approach differs fundamentally from measures that aim at energy conservation behavior, which only focus on a reduction of demand, but do not take into account the perspective of sustainable development. Energy sufficiency aims at selective energy-relevant consumption, household production decisions and decisions with regard to the use of equipment. But it also takes into account fundamental changes of energy-relevant aspects of lifestyles and social practices. Both aspects are linked with changes in the utility aspects of technical appliances (i.e. the cooling capacity) and changes in further utility aspects of consumption goods and services (see above:

(Fischer et al., 2013)). Energy relevant decisions of private households can be found on various decision levels:

- Decisions related to the purchase of equipment (i.e. purchase of a television)
- Decisions related to the technical utility aspects of equipment such as performance, capacity, technological features (i.e. size of the television screen)
- Decisions related to further utility aspects, such as status symbols, social belonging or differentiation, health and esthetical aspects (i.e. extra big television with special technological features as a status symbol)

The ultimately provided utility of technology depends on a chain of effects that starts with basic needs that are independent of culture. These are translated into concrete culturally influenced demands, which are translated into required utility aspects. These required utility aspects are translated into the required technical utility, which is influenced by the equipment and the use of technology. Along this chain the three basic strategies for energy sufficiency, reduction, substitution and adjustment can have an effect on the energy demand.

- Reduction of utility aspects and required technical utility. Can be achieved by changes in consumption decisions (i.e. smaller appliance) or the use of technology (i.e. watching less TV), without qualitative changes in utility. The utility aspects and the utility of the device are still available in principle and the same form, but are less demanded.
- Substitution is another potential energy sufficient option. It applies to decisions related to consumption (i.e. purchasing a bicycle instead of a car), technology use (i.e. wash cloths less frequently and air cloths instead), provision aspects (i.e. buying more fresh food instead of frozen food), and lifestyle (i.e. veganism). Therefore substitution is a qualitative change of demands, utility aspects or technical aspects.
- Adjustment of technology to needed energy service, means firstly, related to consumption, an adjustment of the type of appliance, the size and the functions to the demanded utility aspects. It can be realized for example by sensors or the option to switch off some of the features. Related to the use of technology it means a qualitative (i.e. features that are always switched on but seldom used) and quantitative (i.e. the capacity of a refrigerator) adjustment to the demand.

For all three approaches the ultimate prerequisite for the implementation is the awareness for and the challenging of actual demand, required utility aspects and related contexts. Important influencing factors are the political framework conditions that limit the effects of drivers for higher

energy demand but also enable and empower citizens. Additionally, services provided by companies and municipalities can influence energy related decisions of households as they facilitate and enable citizens to take other options. Finally, the design of appliances (i.e. variable capacity of a refrigerator), infrastructures and services can further enable and facilitate energy sufficient decisions of citizens.

2.3 Policy Measures for Sufficiency

“To adopt sufficiency as a force in policy is to recognize boundaries to a social order and to make normative judgments” (Darby, 2007).

While most of the theories and authors emphasize the role and responsibility of the individual, in recent years some authors concerned by the urgency of environmental problems now claim that sustainability can be initialized at the bottom. But to reach society as a whole measures have to be politically enforced, because the spread and adoption of sufficiency practices by local groups (i.e. Transition Town) is too slow (Linz and Scherhorn, 2011). Others, as (Grunwald, 2011, 2010) explicitly question the “privatization” of sustainability with its emphasis on the responsibility of the individuals’ consumption decisions, as these still take place within a certain setting but do not necessarily change this setting by itself. This is why recently a small but growing body of literature is exploring new scopes and their limitations for policy-making related to sufficiency. The policy proposals aim at changes in framework conditions and the introduction of other legislative measures to enable and facilitate sufficient lifestyles (Schneidewind and Zahrnt, 2013). This shows the focus on changing the setting in a way that facilitates the adoption of more resource-light practices instead of introducing prohibitions. Nevertheless, the authors emphasize that parallel or slightly after the introduction of these facilitating measures, measures need to be implemented that make resource-intensive practices more unattractive. The authors discuss considerations from political science and sociology and perspectives for concrete measures (Stengel, 2013b)(Linz, 2013b)(Alexander, 2013). (Schneidewind, 2013) points out that the highest barrier towards sufficiency measures is the resistance against new regulations, although people accept or are unaware of the magnitude of regulations in their daily lives.

2.4 Criticism of Sufficiency

It has to be mentioned that the concept of sufficiency remains nevertheless a controversial topic and is criticized from various angles. A critique voiced by (Alcott, 2008) is that with regard to the I

= PAT¹ equation all three approaches (consistency, efficiency and sufficiency) focus on the right hand side of the equation and not on the left hand side, the total impact on the environment. He emphasizes the possibility of a potential sufficiency rebound that is widely not taken into account in the literature. In his view, global contracts with defined caps on negative impacts (left hand) would therefore be the necessary measure. Such caps would ultimately also inhibit the rebound effect to occur. However, (Figge et al., 2014) show that the sufficiency rebound does not necessarily occur. They find potential secondary effects, so-called 'double-dividend effects'. This means that the reduction of material consumption would not lead to a rebound but a reinforced sufficiency effect by stimulating others to lower their consumption.

With regard to policy measures, there are concerns and discussions about whether sufficiency in general is compatible with contemporary liberal societies (Müller, 2007; Schneidewind and Zahrnt 2013) and whether measures interfere too strongly with the liberty of the individuals. (Schneidewind and Zahrnt, 2013) argue for an enlightened liberalism that is different from contemporary consumer liberalism. An enlightened liberalism in their view would also take into account the limitation of people's liberty by consumption preferences of others (they argue for example that a street does restrain the liberty, i.e. through the noise, of people not owning a car). Industrial ecologists, in contrast, claim that sufficiency is inadequate for a sustainability strategy, mainly because they view it to be impossible to enforce (Linz, 2013b). Primarily the conflict with contemporary growth capitalism is emphasized, as sufficiency measures are contradicting to the inherent logic of this system (Kallis et al., 2012). Furthermore, implications of global power relations by a unilateral sufficiency strategy are not sufficiently taken into account (Schneidewind, 2013).

As a starting point in this new field, in the following framework conditions of household electricity consumption and respective potential sufficiency measures shall be discussed. Nevertheless, one needs to have in mind these restrictions and unsolved questions. Household electricity demand represents a significant share of the overall electricity demand of about one third (Bertoldi et al., 2012). This is the reason for several legislative projects aiming at efficiency improvements, such as the energy efficiency labels for devices. Nevertheless, electricity demand of households peaked in 2009 reaching the highest demand for over two decades. This is why scientists argue for sufficiency approaches to complement efficiency measures (Darby, 2007; Wilhite and Norgard, 2004). The difficulties related to legislative measures in this field are briefly summarized above. In

¹ I = Impact, P = Population, A = Affluence, T = Technology

the next section energy consumption of German households is put into context, research on the frameworks in which consumption practices take place and investigations of measures influencing household's energy consumption behavior is presented.

3 Determinants influencing Energy Consumption

In Germany, the direct energy consumption of private households amounted in 2011 to 609 TWh, which represents 25.1 percent of the total energy consumption. Direct energy consumption refers to the energy used in households for heating and appliances, while indirect energy consumption comprises the energy consumed by purchasing products and services by households (Han et al., 2013). The indirect energy consumption amounts to about 60 percent of the total energy consumption of private households in Germany (Schoer et al., 2006). While it is important to consider this fact, in this study the focus is put on the direct energy consumption. Direct energy consumption can be distinguished into dwelling related energy use (space heating and ventilation) and user behavior energy use (Han et al., 2013).

Energy for heating (66 per cent) and water heating (16 percent) add up to more than three quarters of the total direct energy consumption. The remaining amount is used for cooking, cooling and electronic devices. Without considering transport the direct energy consumption of households decreased by 7.9 percent compared to 1990. This, however, was also caused by weather conditions (due to a cold winter in 2010 energy consumption amounted to 743 TWh). Additionally, it has to be considered that since the financial crisis in 2007 economic growth was negative or low. Further it is remarkable that in particular electricity consumption increased by 19.2 percent in 2011 compared to 1990 (Umweltbundesamt, 2013) to 137 TWh, which represents about 26.6 percent of the total electricity consumption.

3.1 Why behavioral changes are necessary

While improvements in the energy efficiency of buildings represent a great potential for conservation, particularly in the sector of electric appliances energy efficiency increased in recent decades for example by 80 % for refrigerators (refrigerator from 1990 compared to a A+++ model) (bdew, 2013). Nevertheless, demand increased remarkably by 19.2 percent, with a large share of this increase due to entertainment, IT and communication devices (the share increase from 6.7 percent in 1990 to 25.5 percent in 2011) (bdew, 2013). Abrahamse et al. (2005) identifies drivers of this demand growth on the macro- and on the micro-level. On the macro-level the TEDIC (technological development, economic growth, institutional factors such as government policies, and cultural developments such as increased individualization) factors contribute to the consumption increases. These factors in turn influence the motivational factors, abilities and

opportunities of individuals. This is why in this study and the research project the focus is put on measures how to stop or even reverse this trend.

Some authors emphasize the high potential of energy efficient devices (60 percent according to (Bürger, 2009)) and therefore emphasize the importance of market incentive programs, minimum standards and energy efficiency labelling. However, for example Bürger (2009, p. 80ff) finds a potential of about 20 percent saving potential by changing use routines of private households in Germany. The Swiss Academy of Science estimates for Switzerland up to 30 percent savings till 2050 through psychological and social factors (Aegerter et al., 2012). Furthermore, also the high potentials of energy efficiency need to be exhausted by a sufficient use of these appliances in order to minimize rebound effects (Vosse, 2014).

The trend, parallel to efficiency increases, towards more, bigger and appliances with more features, implicit price signals due to efficiency increases causing the rebound effect and shift in target measures (more efficient TV is longer left switched on, parallel usage of i.e. laptop and TV) and towards smaller households arouse interest in and the insight that additional measures are required. (Bürger, 2009; Sanquist et al., 2010)

3.2 How Change is initiated – The framing of energy consumption decisions

Measures to foster energy conservation as presented below aim at an absolute reduction of energy consumption in households. While they might also induce households to invest in more efficient devices (investment behavior (Han et al., 2013)), all the measures aim to improve the awareness of the level of energy consumption and behavioral changes in order to decrease this level (curtailment behavior (Han et al., 2013)). Some behavioral changes (such as drying clothes in the air) might comprise one of the sufficiency approaches presented above (reduction, substitution, adjustment), while others could just be the correct use of efficient devices and thereby exhaust the full savings potential of these. This is why it is argued that these instruments are contributing to energy sufficiency in the definition presented in the second chapter.

Human behavior, therefore also energy consumption, is determined by various factors. Consumption behavior is theoretically discussed as a social practice, which is a collective action. These enable individuals to simplify activities in the daily life with routines to reduce complexity. The routine actions are not questioned and are not based on conscious decision processes. This fact makes it, however, difficult to influence these actions with interventions (Birzle-Harder et al., 2013; Kaufmann-Hayoz et al., 2011). The individual behavior is embedded in social situations,

institutional contexts, norms and the availability of knowledge. Households' energy consumption is thereby often determined by a combination of habits, structural challenges, such as disincentives, and social norms (Schultz, 2014). Individual preferences and decisions are only one important variable within this setting. This is why sufficiency measures as a policy instrument could work as a variable influencing this setting supporting innovative practices that aim to satisfy needs while taking into account the long-term preservation of livelihoods by material reduction and substitution (Vosse, 2014). In recent years, approaches favored in the domain of behavioral change through policy do not try to limit directly the liberty of citizens for example through a cap on per capita consumption but try to “nudge” individuals or influence their behavior by using social norms. The term “nudge” is used in behavioral economics and can be described as subtly pushing individuals to change their behavior by changing the framing within which the individual decides. (Thaler and Sunstein, 2003) also term it as “soft” or “libertarian paternalism”.

The wide range of factors influencing people's behavior show that only a comprehensive strategy - not singular interventions and regulatory measures - is the most promising option for a significant demand reduction. In Figure 4 a framework developed by (DEFRA, 2005)(Collier et al., 2010) is presented to illustrate such a comprehensive strategy in general. Similar frameworks were developed in the area of sufficiency by (Schneidewind and Zahrt, 2013) and within this research project.

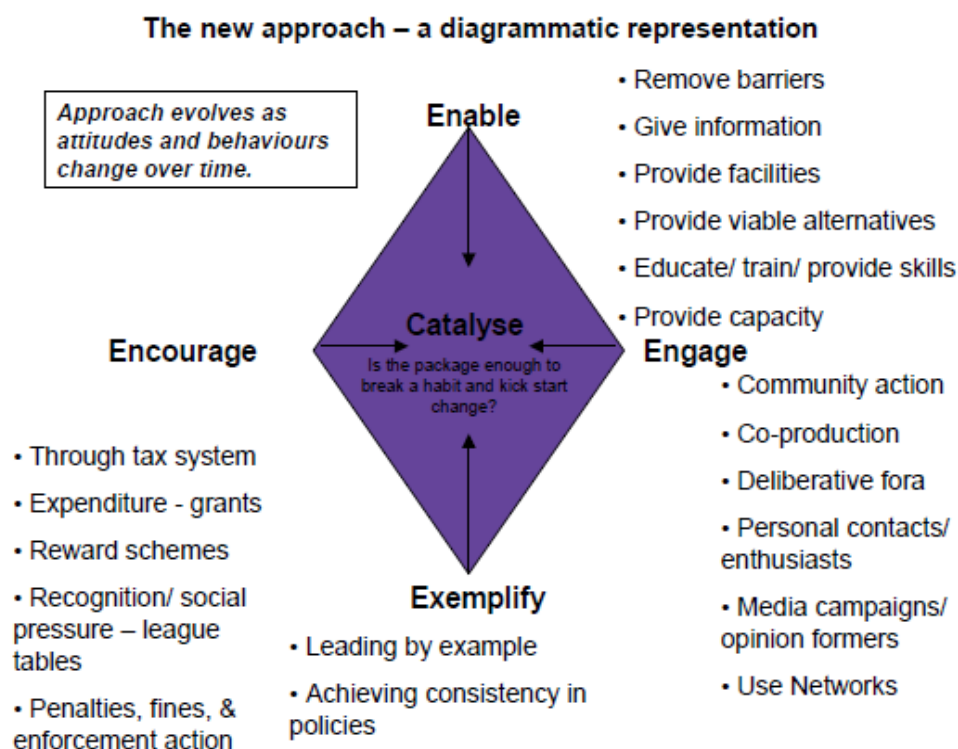


Figure 4 Framework of Interventions to induce behavioral change developed by Defra (source: (DEFRA 2005))

Of special interest for this study is the question, whether financial incentives induce sufficient energy consumption behavior in households and could therefore be part of a sufficiency policy. The instruments presented below, mostly within the categories of “Encourage” and “Enable”, are reviewed in order to give an overview on the measures that exist and that could be part of a comprehensive sufficiency strategy in the area of household electricity consumption. The focus is on interventions addressing the motivation of individuals but as stated above one has to have in mind all factors influencing energy demand. This is why briefly also structural changes are addressed. In chapter 6 a summary of the results of the empirical study is given with a discussion of which policy levels (municipal, national, supranational) are important for the implementation of a coherent strategy.

3.3 Encourage and Enable the Energy Demand Reduction

Important contributions related to these additional measures were done in recent years in the fields of environmental psychology and behavioral economics. The first investigations were carried out in the 1970s when concerns over resource depletion due to the oil crises triggered interest in energy conservation. But while research and political measures in energy efficiency advanced remarkably since then, Wesley Schultz observes a lack of behavioral studies in the light of the urgency of mitigating climate change, because of the focus of industry and government policies on technological innovations (Schultz, 2010). While the interventions presented below are mainly from the literature of behavioral change with regard to electricity consumption, they are discussed here with regard to energy sufficiency. Most of the interventions create in general favorable framework conditions that encourage and enable citizens to adopt sufficient electricity consumption behavior.

In general the theories and related interventions can be split into two major areas. The first ones are directly related to energy consumption of households and aim to increase extrinsically motivations of individuals. The main interventions developed in this area are antecedent and consequence interventions. Most of these interventions try to influence one or more determinants of behavior. These determinants are knowledge, as well as, personal and social norms. A minor one, that means interventions that are less present in the literature related to energy conservation, is the measure of default options. A short explanation of default options related to energy savings is given below.

Secondly, research on intrinsic motivation of individuals for pro-environmental behavior and means to stimulate this drive to undertake conservation behavior is an emerging field, but still on the conceptual level. The relatively young research in this area is still at the stage of conceptualization and measurement questions. It will probably require more time to advance and come to concrete recommendations how to foster intrinsic motivation. A brief overview of current advances in this field is included in this literature review as it is considered by the author to be a different approach compared to the one mentioned first. It is further argued that fostering intrinsic motivation might provide more effective long-term results and prevent rebound effects compared to the interventions mentioned above.

In the subsequent sections these concepts and measures are presented in more detail including a discussion of the effectiveness of measures that were investigated in experiments and field studies. Summaries of the effects of interventions presented below can be found in (Abrahamse et al., 2005; Darby, 2006; Rosenkranz et al., 2013).

3.4 Theories and Interventions directly related to Energy Consumption

Many studies over the past forty years investigated energy consumption behavior and measures to curb energy demand of households. The first wave of research in this area was triggered by the oil crises in 1973 and 1979/80, with a renewed interest from 2000 on with the increasing concern for climate change. The following sections are based on three major reviews by (Abrahamse et al., 2005), (Darby, 2006) and (Rosenkranz et al., 2013). An important caveat that is given by (Abrahamse et al., 2005) with respect to many of these studies is the fact that it is difficult to draw generalizations because most households who participate in these studies tend to have an above-average income, higher educated and are mostly highly motivated to reduce their demand. Additionally, most studies were short term studies, over a period of several weeks with a small population of not more than several hundreds. However, in recent years, studies, particularly the ones using online portals, were carried with larger samples and treatment as well as evaluation periods were enlarged which might provide more generalizability.

3.4.1 Antecedent Interventions

The aim of antecedent interventions is to influence determinants of energy consumption behavior before the execution of the act. Through commitment, goal setting or information the underlying behavioral determinants of an act, such as knowledge about alternatives or potential consequences, the consumption decision shall be influenced. Most studies in this field focus on the investigation of the influence of information on the energy conservation behavior of

consumers. Moreover, most studies are focused on quantitative evaluation of the savings that were achieved, while measures and behavioral adjustments to achieve a demand reduction are rarely investigated. The three major tools used for diffusion of information: workshops, mass media campaigns, such as leaflets and programs in TV, and home energy audits. Apart from these, commitment that means an oral or written promise to change behavior in order to save energy is an intervention activating the personal or social (when made public) norms. It is often linked with goal setting that gives households a reference point, such as to save 5 percent of their electricity consumption. This goal can be set externally (i.e. by experimenters) or by the households themselves.

While information alone such as through mass media campaigns and leaflets with general recommendations proved to be not (very) effective, information tailored to the individual households, i.e. through home energy audits, has proven to be useful. The review by (Abrahamse et al., 2005) found that antecedent interventions such as goal setting and commitment have a significant influence on conservation efforts. But as these are mixed with each other as well as with information strategies it is difficult to determine the effect of the single intervention.

3.4.2 Consequence interventions – Rewards, Feedback and Social Norms

Consequence interventions are those that aim at influencing individuals after they behaved in a certain way. This means that some kind of feedback is given or a reward for the desired behavior after the action, in this case electricity consumption, was carried out. The *Einsparbonus* within the KlimaFix tariff is such a consequence intervention, rewarding the effort to save electricity in the past year with a premium. A similar premium, with a different rewarding scheme, is paid by the municipality of Frankfurt within the framework of the campaign “Frankfurt saves electric Energy” (Frankfurt spart Strom)². Further examples for premium models with other designs are of the utility companies STAWAG³ and EnergieGut⁴. However, except some psychological experiments, no evaluation of rewarding schemes with larger sample sizes was found in the literature.

Rewards are generally found to be an appropriate measure in order to stimulate individuals’ efforts for demand reduction of direct energy consumption. Based on microeconomic theory,

² An expert interview was carried out with an employee of the municipality, see chapter 5 for the results of the interview. More information about the campaign: www.frankfurt-spart-strom.de

³ The local utility company STAWAG introduced a premium of 100 € for 10% electricity conservation compared to the year before. Customers have to register the year before the saving effort is planned.

⁴ EnergieGut is a consortium of various local utility companies in Germany. It advertises, that it was the first company with an „Electricity savings tariff“. The premium design is a graduated one with 10€ (5€ in the renewable energy tariff) for 5 percent savings, 20 € (10€) for 10 percent savings and so on.

(Oikonomou et al., 2009) found that market instruments, such as financial incentives, could stimulate collective energy saving behavior when combined with information campaigns in the short run. In the review by (Abrahamse et al., 2005) interventions using monetary rewards show a potential of ca. 10 percent when combined with feedback.

Average Household Electricity Savings (4-12%) by Feedback Type

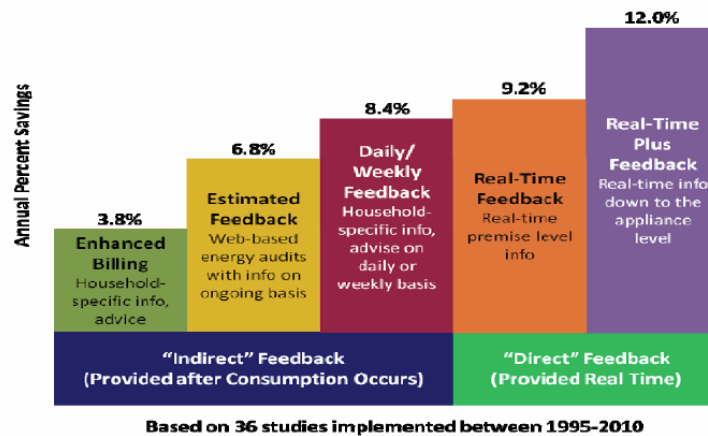


Figure 5 Conservation Potentials of different forms of Feedback Interventions
(source: (Rosenkranz et al. 2013, p. 24))

However, an important caveat is the short-lived effect of rewards found in several studies with the positive effect disappearing when the financial incentive is no longer received. Several authors argue that monetary incentives provide a different kind of motivation (extrinsic) for customers to reduce electricity consumption. This is why the original objective of energy conservation is replaced by the focus on the reward. For the individual customer the motive to reduce his consumption is to gain money which is separated from the insight that a reduction is 'reasonable', which is the cause of the consumption increase after the treatment phase. (Kaiser, 2014) (Darby, 2006)

Besides this substantive drawback, further problems with monetary incentives are the short-lived nature of most programs because of budgetary issues, evidence for even detrimental effects and the reliance on conscious thinking, while most energy consumption is based on routines. (Handgraaf et al., 2013)

(Darby, 2006) emphasizes the importance of feedback as most people are largely unaware of their own domestic energy consumption. She identifies this fact as a major cause for wastage and the small effect of information campaigns. Various studies have been carried out investigating the effect of feedback on customers' energy conservation behavior such quarterly feedback on the bill or with displays. These studies found the more frequent feedback was given the higher savings were achieved (Abrahamse et al., 2005). Additionally, (Darby, 2006) gives a 3 months treatment

phase as a rule of thumb to practice new behavioral routines for a lasting effect. When the treatment lasts longer than 3 months routines are being changed and the effect begins to last longer. Nevertheless, further feedback is desirable to stabilize the effect and for additional savings. Figure 5 provides an illustration based on the review by (Darby, 2006).

Comparative feedback means that additionally to information of the personal electricity consumption other figures are provided, such as the demand of neighbors, the average demand of the neighborhood or nationwide. The comparison creates a feeling of competition, social pressure or, as termed in the theory, activates social norms especially when a reference group is used that is relevant for the individual (such as the neighborhood) (Nolan et al., 2008; Schultz et al., 2007). However, such comparative and normative feedback could also lead to an increase in consumption of low consuming households as several studies showed (Brandon and Lewis, 1999; Schultz et al., 2007). Nevertheless, it was found that an additional message given with the comparison, such as a smiley with a happy face for below average consumption, eliminates this so-called boomerang effect. Various authors emphasize the long-term effect of comparative feedbacks and explain it with the activation of social norms, which are only slowly reversed after the end of the treatment period (Allcott and Mullainathan, 2010; Allcott, 2011). Additionally, (Allcott and Mullainathan, 2010) emphasize the cost effectiveness of such norm-based instruments compared to monetary incentives. (Handgraaf et al., 2013) even found the activation of social norms through public comparability of the amount of electric energy consumed to be more effective compared to monetary rewards as well in the magnitude as in the lastingness of the effect.

Online Portals

In the last couple of years with increasing numbers of Smartphone applications such as a remote control for lights at home, the interest of scientist to use such applications also for energy conservation rose considerably. The rising distribution of smart meters also contributed to this development. Various studies examine the effect of internet platforms for energy conservation in combination or without smart metering. In cases without smart meters customers were encouraged to read and record their meter reading in an online portal. The advantage emphasized by scientist is that a range of interventions from above can be mixed and combined with playful suggestions for energy saving measures. Two studies are presented in more detail. The SM500 project because it entailed the highest savings and Velix because it had the biggest sample size and is now applied by 20 Swiss utility companies.

One of these projects is the SM500 project of Vorarlberger Kraftwerke AG. Within this project various combinations of only feedback through an internet platform (indication of consumption per second) and monthly invoices were tested compared to three other scenarios. In these scenarios the basic feedback treatment was complemented by a monthly personal energy report (1), energy consulting (2) and energy-saving-competition (3). The highest saving rate was achieved in the energy consulting scenario with average savings of about 5.68 percent compared to customers without any treatment. However, the sample size of 500 customers in total was relatively small.(Gruber et al., 2012)

Velix was carried out within the research project “Bits to Energy” of ETH Zürich and was further developed by the spin-off BEN Energy and is now used by more than 20 local utility companies in Switzerland. The project started in April 2010 and within less than one year almost 10,000 customers of Vorarlberger Kraftwerke AG joined the platform. On the platform it was tested whether there is a difference between only descriptive comparative feedback given and a combination of descriptive and injunctive comparative feedback. The results show, confirming the results of (Allcott, 2011) and (Schultz et al., 2007) that the combination leads to higher decreases for customers with above median consumption and a very low increase of consumption for below median customers compared to only descriptive feedback. The relatively low average reduction might be caused by the relatively large sample size and the fact that in other studies participants knew that they were part of an experiment and were thereby possibly more motivated.(Loock et al., 2011)

Table 2: Saving potentials of Internet Portals

	Velix	Intellikon	E-Motivation	IZES Praxistest	SM500
Reduction of the power consumption related to the comparison group	2.7 %	3.75 %	3 % to 4.5 % The comparison group also used smart meters	1.7 %	0.65 %, 3.87 % (1), 5.68 % (2), 4,14 % (3)
Sample Size	9,929	2,000	1,200	497	500
Treatment			Monthly Invoice and Web Portal		

Adapted from: (Gruber et al., 2012); Sources: (Fraunhoferinstitut für Solare Energiesysteme ISE, 2011; Hoffmann et al., 2012; Kollmann et al., 2011; Loock et al., 2011)

Table 2 shows the effects of several research projects with web portals carried out in recent years in Germany, Austria and Switzerland. While Velix achieved the highest sample size, in other projects higher savings were achieved. This might be, because all the other projects were explicit research projects, while participants of Velix voluntarily took part in the intervention.

3.5 Structural Interventions

Apart from these interventions aiming at enabling, engaging and encouraging individuals for a decrease of energy consumption, also structural changes are an option discussed. These structural interventions also change the framing within which the energy consumption decision is taken, which is the reason for presenting briefly options in this domain. While the current tariff model in Germany rewards higher consumption, through a monthly baseline rate (Grundpreis) and a constant operation rate per kWh (Arbeitspreis) and thereby decreasing relative costs (per kWh) with increasing consumption, other countries such as Italy, USA (California), Egypt and Cuba have a progressive tariff model. In this model the operation rate per kWh increases gradually with increasing consumption. (Wilhite and Norgard, 2004) suggest a progressive electricity tariff in order to achieve a sustained demand reduction. In contrast (Tews, 2011) discusses this option more critically pointing at potential justice problems (for example individuals which cannot decrease energy consumption because of health issues, regular visits or relatives for whom they care and that stay regularly in the household but are not part of the household) and because of the inelasticity of energy consumption. Electric energy is one of the most inelastic goods and consumers react only in the long-term to price increases (OECD, 2008). An experiment within the research project Transpose found that price elasticity in Germany is about 0.3 in short-term and 0.7 in long-term. The effect of the changed tariff model on purchase decisions was also only marginal while household income and available time were much more influential (Hamenstädt, 2009).

A few studies discuss the topic of energy saving feed-in-tariffs that means a premium for each saved kilowatt-hour theoretically (Bertoldi et al., 2013; Eyre, 2013; Pehnt et al., 2009), but no empirical projects of such measures were found.

3.6.1 Default options

A default option is the option an individual receives if it does not explicitly decide to take another (more energy intensive) option or as (Pichert and Katsikopoulos, 2008) define it: “the condition that is imposed when an individual fails to make a decision”. People hardly choose another option than the one which requires no further effort. (Thaler and Sunstein, 2008) observed a regular and

strong inertia behavior of humans that means people regularly stick to the “default option”. This shows that a measure involving default options is not aimed at behavioral change but using routines.

Related to energy conservation, this observation could be used to achieve higher savings by setting the default option the most energy saving option in appliances. However, in most devices the default option is often not the most environmentally friendly one. The standard settings on phones and laptops are usually not the most energy-conservation mode (Rosenkranz et al., 2013). Using these findings could lead to environmentally-friendly regulation on appliances. An example for the magnitude of savings that could be achieved by such legislative measures is presented by (McCalley, 2006). He found that setting the default temperature on washing machines to “cold” could save up to 24% of energy compared to regular machine settings, in which temperature default settings are higher than cold for each washing program. (Thaler and Sunstein, 2003) call this “soft” or “libertarian paternalism” for the environment, because people who find that they do not like the default option could easily chose another option.

3.6 Theories on Environmental Attitudes

A couple of scientists try to reach beyond these immediate interventions described above. They aim at investigating the reasons behind the intrinsic motivation of people that already care today for the environment, without any intervention, and specifically try to reduce their electric energy consumption. The purpose of this research is to find out how this intrinsic motivation could be fostered or incited. The justification provided by this group of researches is the fact that intrinsic motivation lasts longer and is stronger than any of the ones stimulated by the interventions above (Otto et al., 2014; Schultz, 2005, 2001; Davis et al., 2009). Additionally, (Kaiser, 2014; Otto et al., 2014) argue, that by stimulating this kind of “irrational behavior” rebound effect could be prevented.

However, the research in this field began only a couple of years ago. This is the reason why there are still conclusions from which policy proposals could be developed. But one indication is given by (Brügger et al., 2011), who find people enjoying time in nature for example practicing outdoor sports are likely to be more “connected to nature”. The idea, which could be drawn from this insight, is to encourage and reinforce people to spend time in nature in order to foster intrinsic pro-environmental motivation.

3.7 Summary

The Setsuden campaign in Japan in the months after the Fukushima nuclear disaster in 2011, shows the magnitude of energy conservation that can be achieved through changes in energy consumption behavior. Because the remaining nuclear power plants were shut down shortly after the catastrophe, Japan faced an enormous lack of electric energy. Throughout the summer in 2011 a load reduction of about 19% and a consumption reduction of 14% were achieved (Pawlata, 2012; Luhmann, 2012; Megyesi, 2012). Stengel (2013) regards the campaign to be a sufficiency campaign, although it has to be noted that the campaign was successful in a society that was under the impression of an extreme catastrophe facing blackouts and with an economy that was certainly not growing at this point of time. Nevertheless, it still shows the potential of savings that can be achieved by changes in consumption behavior.

As it was shown in this chapter there exists a wide range of interventions for energy conservation in households. Feedback, particularly through smart meters and online portals, makes energy consumption visible compared to today when this feedback is only given once a year with the electricity bill. As shown in Figure 5 electric energy conservation of up to 12 % in the maximum case were achieved by feedback measures in experiments. Particularly (Darby, 2006) emphasizes the importance of disclosing electric energy consumption to citizens.

In regard to cost efficiency and impacts on savings normative feedback, as provided by the OPOWER utility company seems to be an interesting approach. In the experiment, savings of about 6.3 percent (for the highest decile) were realized with an average of 2 percent for all customers. It is important to notice that with this kind of treatment it was achieved that below-average consumers did not raise their consumption level throughout the treatment. An illustration of the normative feedback is given in Figure 6.

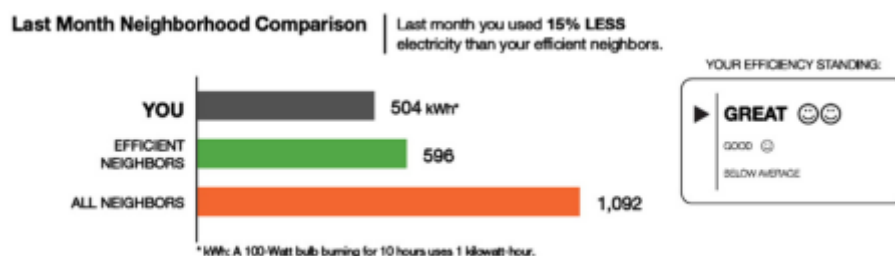


Figure 6 Normative feedback from the OPOWER experiment (Source: (Hunt Allcott 2011))

However, in general the studies reviewed, except (Brügger et al., 2011; Schultz, 2001), did not mention the concept of sufficiency and the question of enough electricity consumption, such as whether there is a lower and upper threshold. No studies on individuals' perception of their energy consumption behavior and how they potentially changed their consumption behavior in order to achieve a certain reduction were found.

In regard to the premium of the local municipal utility company in Heidelberg some preliminary theses can be drawn from the literature. First, from a theoretical point of view (Oikonomou et al., 2009) state that market instruments, such as financial incentives, could stimulate collective energy saving behavior when combined with information campaigns in the short run. This would mean for the customers of the tariff, that at least a share of the customers get the premium. However, it is emphasized that policies stressing the moral obligation and inducing self-monitoring are important for the longer term, as it was found that the intention to save energy is strongly related to psychological factors. This could for example be realized by a normative injunctive feedback as presented above in the case of OPOWER. Second, from the fact that (Darby, 2006, 2001) emphasize the importance of visibility of electric energy consumption, it could be that the still remaining lack of information about actual consumption due to the feedback given just once a year with the bill poses problems to customers of the tariff to achieve the saving goal of 15 %. Thirdly, as found by (Loock et al., 2013) high default goals as set by the utility company with the goal of 15 % (note that the maximum reduction that was achieved in experiments with continuous feedback was 12% (Darby, 2006)) may discourage customers to try to achieve the goal. Finally, the finding that monetary incentives cease to have an impact when the reward is no longer given (Darby, 2006), could result in people having received the premium increasing their consumption in the years after if no further premium is received.

4 Methodology

In this chapter first the theory of the methods applied is briefly introduced, followed by a discussion of the intentions for the methods applied. In a third part some background information on the company, the data for the quantitative evaluation and the interviews is given.

4.1 Mixed Methods Research Theory

Quantitative and qualitative methods in social science research are often described as being in opposition to each other. Important in this regard is that the knowledge, which is aimed to be generated, also determines the selection of the method. While qualitative research methods are used to explore phenomena that were not studied before or to develop hypotheses, quantitative methods may be also used for this purpose but more importantly to scrutinize hypotheses created before. The often claimed opposition of both methods revolves around the historical development of these methods and the philosophy of science behind. While quantitative methods originates in philosophical positivism and the theoretical idea that there is an objective world (“out there”) that can be investigated and described by gathering empirical data, qualitative researchers rejected positivism in the early 1900s. (Trochim and Donnelly, 2008)

Although, the research using quantitative and qualitative methods is expected to provide a superior, complete evaluation of the tariff, the proposed mixed methods approach is generally disputed. In the following some theoretical considerations in regard to the methods will be discussed. Mixed methods research approaches have become popular in last few years in various disciplines given the advantages associated with its application. However, far-ranging criticism and debates arose with the emergence of this approach in relation to the definition, philosophical controversies and procedural steps.

There are a number of controversies about the use of mixed methods. (Creswell, 2013) identified eleven major issues that are not resolved in regard to mixed methods research, ranging from the changing and expanding definitions of mixed methods, whether it is a “new” approach to whether there is value added by mixed methods research in contrast to quantitative and qualitative approaches. Not all of these issues can be discussed here in detail. One major dispute revolves around the question whether quantitative and qualitative methods can be combined at all because of a stated difference in the paradigms they are based on. (Onwuegbuzie and Leech, 2005) identify three different positions in this discussion. The so-called *purists* restrict themselves

to exclusively one methodology and point out that the paradigms are incompatible, in terms of how the world is viewed and what is important to know. *Situationalists* also maintain a mono-method approach while stating that both methods have a certain value. *Pragmatists* in contrast, try to combine both methodologies emphasizing the additional value obtained through this approach, while putting less emphasis on the philosophical implications. Nevertheless, this dispute still remains unsolved within the scientific community in general and individual researchers have to decide which argument is the most reasonable for them. In this research project the pragmatic stance is taken, as it is assumed that the mixed method approach reveals a more comprehensive picture, while it is recognized that the methods applied arise from different paradigms. Nevertheless, it is assumed to be advantageous in a study investigating an innovative intervention, on which no study was done before, on the one hand it is reasonable to use explorative qualitative research for the perception of the premium by individuals, but on the other hand, also quantitative methods to investigate overall effects. However, it is important to take the doubts and controversies outlined above into account and have these issues in mind when designing a research project and decide from case to case which methodology is most advantageous for the phenomenon that shall be investigated.

In the framework proposed by (Goerres and Prinzen, 2010) a research project applying mixed methods has to meet two necessary conditions and at least one out of six sufficient conditions to be superior to a mono-method approach. The two necessary conditions are, (1) the nature of the social phenomenon under investigation, that means in the best case the object that shall be studied should be measurable at different points in time in order to allow that interviews are carried out successively, and (2) the research project and the questions must allow for the application of the mixed methods approach. In the case of this research project, these two conditions have been met, as the answers of interviewees are unlikely to change drastically from one day to the other and the questions raised are to be investigated using mixed methods. It is further claimed that at least the sixth sufficient condition⁵ of triangulation is met for this research project, as it was argued above that the methods are applied in parallel in order to receive a comprehensive picture of the phenomenon under investigation, in this case the reaction of customers to the new tariff. Using triangulation knowledge generated by both quantitative and

⁵ The sufficient conditions according to (Goerres and Prinzen, 2010) are: „1. Varying possibilities of data collection, 2. Cases fit the quantitative model to varying degrees, 3. Generating or testing a qualitative instrument, 4. Generating hypotheses or concepts and testing for scope, 5. Unexpected research results in a quantitative study, 6. Triangulation, validation of results or measurement.”

qualitative methods are used equivalently or better integrated instead of putting them into opposition (Flick, 2006; Kelle, 2007).

4.1.1 Quantitative Methods

Quantitative research methods in social science are, as mentioned above, based on the philosophy of positivism and therefore try to systematically investigate empirically social phenomena by applying statistical, mathematical or computational techniques. The objective of this inductive process is to validate theories and hypotheses on phenomena with large sample sizes, with the aim of finding a result that is as unbiased as possible and therefore generalizable to a larger population. Methods employed for data gathering are interviews, questionnaires and experiments. Descriptive, inferential and multivariate statistics and network analysis are used as methods of analyzing this data.

The aim of descriptive statistics, as applied in this research project, is to present and order empirical data in form of table, indexes or graphics in a precise way. In contrast to inferential statistics or inductive statistics, which unfortunately cannot be applied in this study due to missing data, the sample is rather summarized than used to gain insights and potential correlations about the population of the data. In the case of this study, this means that it can be controlled for whether or not the premium had an effect on the energy conservation behavior of households ('what is or what does the data show?'), but it cannot be learned about the population in a way that for example the premium has an effect on a certain group with certain characteristics, as these characteristics could not be obtained. Measures that are used when applying descriptive statistics are measures of central tendency, such as mean, median and mode. Besides these, measures of variability such as standard deviation, minima and maxima, kurtosis and skewness are used to analyze the data. While the reduction of large data sets to a single indicator or measures such as the mean there is the risk that the original data is distorted or details are lost by the reduction. Nevertheless, with descriptive statistics powerful summaries can be done that enable the researcher to compare populations or units. (Trochim and Donnelly, 2008)

4.1.2 Qualitative Methods

Important for qualitative methods is the characteristic to be open and flexible (Lamnek, 2005). Openness means that the research process is explorative instead of verifying or falsifying hypotheses. In the case of this study this characteristic is important with regard to interviewees' perception of the premium. Although hypotheses were generated after reviewing the literature and the quantitative evaluation, the openness guarantees to find out about the perceptions of

customers instead of giving anticipated options in a questionnaire. Thereby it is possible to describe social practices more precisely and to explore and understand patterns of interpretation and the reasoning behind practices of individuals (Flick, 2006).

There are various instruments of data gathering in qualitative research such as participant and non-participant observation, field notes, interviews (structured, semi-structured and unstructured), and focus groups (Bryman, 2012). The method of problem-centered interviews, which is also applied in this study, was developed in an attempt to combine narrative with topical interviewing. Firstly proposed and designed by Witzel in 1982, it was used for studies that focused on biographical experiences in this time. Later on it was applied in other fields of social research. The interview begins with an open narration followed by a more thematic part. For the semi-structured part of the interview the researcher prepares a guideline with topics and questions that shall be answered. In order not to distort the narration of the interviewee, it is favorable to introduce these through immanent questions that arise from the narration. The advantages of problem-centered interviews (PCI) are that limitations of the respective one method can be overcome. In the case of narrations it is sometimes difficult to stimulate the interviewee to speak freely, this is why it is useful to include some concrete questions in the guideline. These can be used to receive a reasonable level of data from the interview, even though a narration was not initiated. On the other hand, it also gives the interviewees more freedom to decide on the content and the emphasis on certain topics that are important for them (Scheibelhofer, 2008; Witzel, 2000). For this study the application of this method was chosen because of the advantage that in the narrations the interviewees' practices with regard to electric energy conservation as well as their perception of the premium can be explored while it still leaves the potential to gather answers on specific questions.

The advantage of qualitative interviews compared with other qualitative methods is the fact that the data is stored without alternation (Lamnek, 2005). It depends of course on the preciseness of the transcription and also the data that is recorded is often already altered due to the process of understanding between the interviewer and the interviewee. Nevertheless, with the transcript a high degree of exactness and traceability is guaranteed (Lamnek, 2005).

Analysis of the interviews

Various methods were developed to analyze interviews such as grounded theory, objective hermeneutics, content analysis, coding, and mechanical techniques. In this study qualitative content analysis developed by Mayring is used for the advantage of its problem oriented process

in contrast to the also often used grounded theory. By applying content analysis there is the option that besides generating inductive elements also deductive elements can be implemented in the process of analyses. Thereby hypotheses can be validated, while the content of the interviews is being inductively summarized, which potentially reveals new aspects. The advantage of the qualitative content analysis compared to a common interpretation is the fact that the analysis is being split up into several steps that are determined in advance, which makes them better traceable and understandable (Mayring, 2010). Figure 7 shows the process that is applied for the analysis of the interviews according to Mayring (2010).

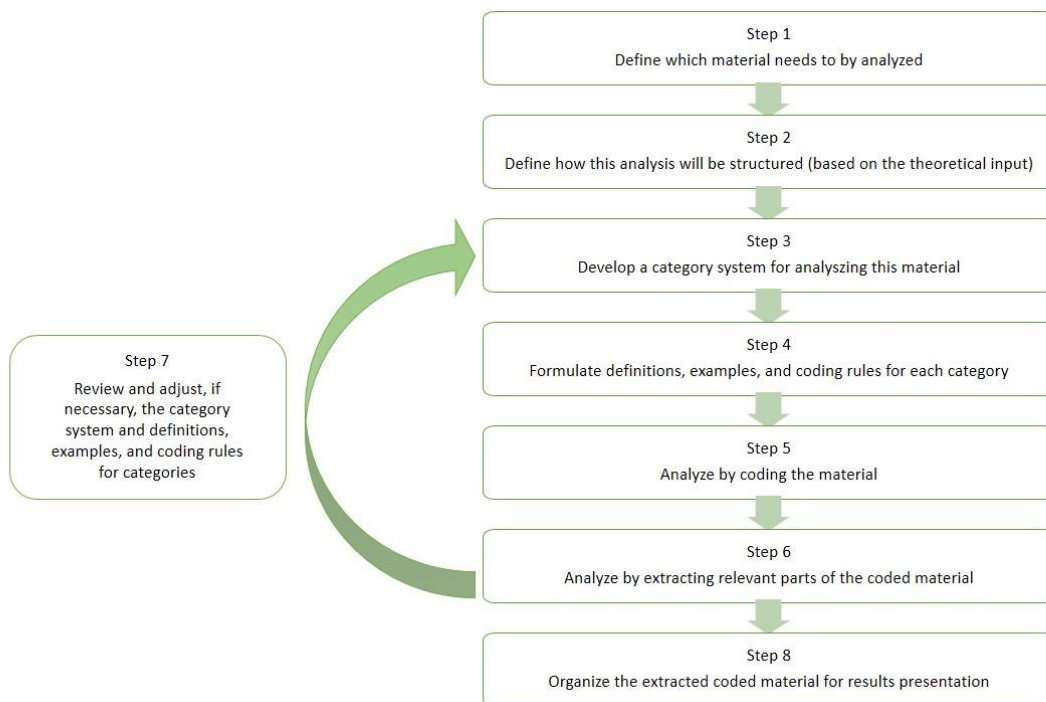


Figure 7 Qualitative structured content analysis (adapted and translated from Mayring (2010, p. 93))

The Expert Interviews

Expert interviews are a subcategory of semi-structured interviews with the experts determined deliberately by the researcher (Muskat et al., 2012). In the literature there is a still unresolved discussion on the question what the term expert means. While there are advocates of a “narrower” definition, such as (Meuser and Nagel, 1991), who define experts as humans that acquired special knowledge by their professional position, others such as (Gläser and Laudel, 2004) argue for a “wider” definition of what an expert is. For them an expert is an individual “that have a special knowledge about social issues and expert interviews is a method to exploit this knowledge” (p. 10). In the case of this study the experts are all professionally active in the field of research with different focal points. There are various aims for which expert interviews can be

used. Firstly, they are used for exploration and orientation in a new field of research and to thereby generate hypotheses. Secondly, systemizing expert interviews are used to complement information that was obtained using other methods with context information. Thirdly, theory-generating expert interviews are carried out with the aim of developing a typology or a theory about an issue with the knowledge of various experts. This shows that process as well as context knowledge can be obtained using expert interviews. (Flick, 2006) In expert interviews generally a stricter interview guide is developed to exclude less productive topics and focus on the issue for which the interview is carried out. For the analysis of expert interviews generally content analysis such as the method developed by (Mayring, 2010) or modified versions of it such as the one by (Gläser and Laudel, 2004).

4.2 Stadtwerke Heidelberg and KlimaFix

The utility company Stadtwerke Heidelberg was founded in 1872 with the start of public water supply. It fast developed further sectors of public service provision such as public transport and the construction of the municipal electricity plant in 1899. During the past one hundred years the company grew to a big municipal company. Nowadays, the Stadtwerke Heidelberg GmbH is the parent company with several subsidiaries for electricity sales, the electricity grid, public transport, swimming pools among others. Besides these services the company also is a provider of natural gas, district heating and water supply. Furthermore, it holds additional shares of five other companies. The parent company is 100 percent owned by the city of Heidelberg. The Stadtwerke Heidelberg has a market share in the electricity sector of the city of about 85%. With regard to the electricity mix the company plans to change the mix till 2017 for the whole company to be free from electricity from nuclear power plants. The current electricity mix is made up as presented in Figure 8. Besides the KlimaFix tariff which is described in more detail below, the company has a portfolio of various other tariffs, for example with smart meters, but also with a conventional electricity mix. (Stadtwerke Heidelberg, 2012)

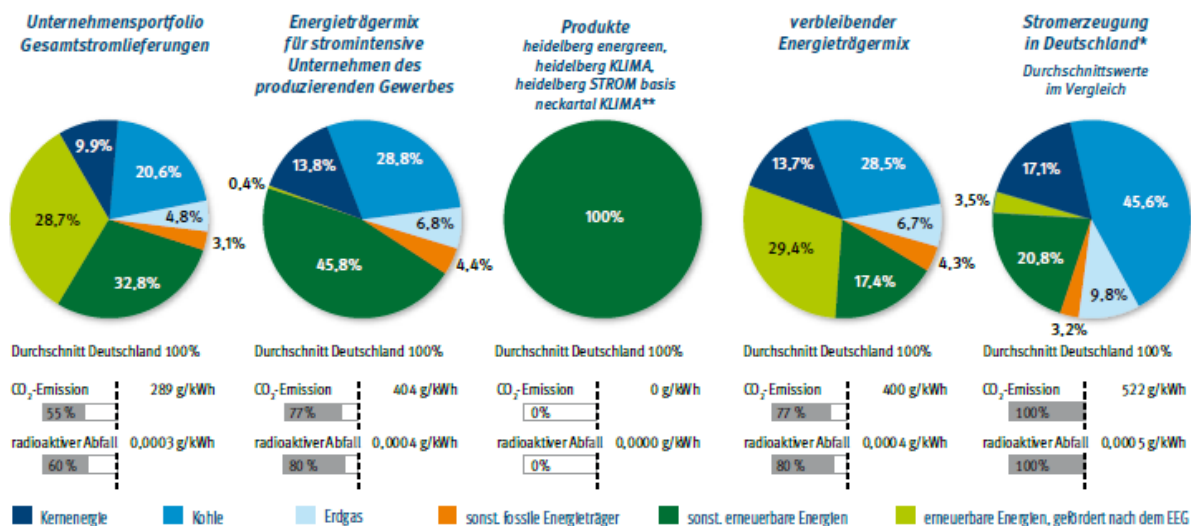


Figure 8 Electricity Mixes: In the middle the mix for KlimaFix customers, second from the right the mix for default supplier customers and on the right the average of Germany (source⁶)

⁶ <https://www.swhd.de/de/Energie-und-Wasser/Strom/Daten-zum-Strom/Daten-zum-Strom/Stromkennzeichnung2012-4c.jpg> (accessed: 07.10.2014)

The KlimaFix-Tariff

The KlimaFix contract was introduced on the 1st of January 2010 to provide customers an electricity tariff with 100 percent of the energy generated by renewable energy sources. The tariff is certified with the ok-power label. Additionally, the company advertises that it pays 15 € for each new customer for a fund, that is jointly administered by environmental NGOs and the company and dedicated to climate change project in the region (*Klimabonus*). Besides that, the utility company advertises that 0.5 cent/kWh are financing projects for climate change mitigation in cooperation with BUND Germany. As a third advantage of the tariff the *Einsparbonus* for customers of the tariff is advertised. After the second annual billing customers who saved 15 percent electric energy compared to the previous year get a premium of 15 € credit on their bill. The price structure of the tariff is tiered into three groups according to the yearly energy demand and an additional offer with varying prices for consumption during the day and night. The prices are shown in Table 3.

Table 3 Price structure of the tariffs: KlimaFix and Heidelberg Strom basis ((Stadtwerke Heidelberg, 2014))

	<i>Heidelberg KlimaFix 2015/2 (incl. taxes)</i>	<i>Heidelberg Strom basis (inkl. taxes)</i>
<i>Customer Group S (- 2,482 kWh/a)</i>		
<i>Price per kWh [ct/kWh]</i>	26.58	29.39
<i>Base price [€/month]</i>	4.11	4.11
<i>Customer Group M (2,482 – 5,444 kWh/a)</i>		
<i>Price per kWh [ct/kWh]</i>	23.61	26.42
<i>Base price [€/month]</i>	10.26	10.26
<i>Customer Group M (above 5,444 kWh/a)</i>		
<i>Price per kWh [ct/kWh]</i>	25.87	26.42
<i>Night tariff</i>		
<i>Price per kWh [ct/kWh] day</i>	26.61	26.42
<i>Price per kWh [ct/kWh] night</i>	18.99	21.82
<i>Base price [€/month]</i>	13.34	13.34

The Comparison Group

The customers of the comparison group have the tariff *Heidelberg Strom basis*. This tariff is the default supplier contract which means, that customers who do not choose another contract receive this product when moving in a new flat or house in Heidelberg. It was chosen as a comparison group because it is assumed that these customers are the ones that care the least for their electricity consumption because these are often rather costly tariffs that could be changed easily to another tariff. For example Heidelberg Strom fix is significantly cheaper with the same electricity mix as Heidelberg basis. That is why it is assumed that these customers also do not consciously try to reduce their consumption, compared to KlimaFix customers that are incentivized by the *Einsparbonus* to reduce their consumption. The costs are tiered like in the KlimaFix tariff according to customer groups. The costs and the electricity mix are shown above in more detail.

4.3 The Research Process

4.3.1 Quantitative Evaluation

The quantitative evaluation carried out is expected to provide insights on the effectiveness of the premium in stimulating energy conservation of customers. The data for the evaluation was provided by the local utility company Stadtwerke Heidelberg as agreed upon in a meeting on the 7th March 2014. It comprises data of the demand of KlimaFix-customers as well as data of a comparison group of customers with a default supplier tariff (for a description of the company and conditions of both contracts see above). The comparison group has a similar sample size as the KlimaFix group (see below Data and Data Quality). In cooperation with the institute (ifeu) five preliminary hypotheses were developed before receiving the data set:

1. Compared to the comparison group, customers of the KlimaFix-tariff saved on average more electric energy since having the tariff due to the incentive of the premium.
2. The difference in the level of savings and the share of customers that saved more than 15% between comparison group and KlimaFix-group is not significant, as the reward of 15 € is relatively low. (difference of not more than 2% in savings rate and the share)
3. Compared to the comparison group a larger share of KlimaFix-customers have a below average consumption level.
4. KlimaFix-customers that have the contract for more than one year tend to have saved more electricity in the first year than in the subsequent years.
5. The customers of the KlimaFix-tariff can be split into subgroups such as customers with a high consumption level at the start of the contract showing larger (percentage) savings and customers with a low consumption level staying at this lower level.

In order to validate these hypotheses the statistic software *R* was used to investigate the data set. As stated above, no inferential statistics could be carried out as only consumption levels, customer IDs, billing dates and the post code was included in the data set. To validate the first hypothesis the average consumption levels of KlimaFix customers and comparison group for three years (2011 to 2013 for a reasonably large sample size with only customers that had the tariff for the complete three years) were calculated and compared. To test the second hypothesis the dataset of the comparison group was investigated and yearly differences of consumption levels were compared in order to find out the share of customers that had saved more than 15% (so that they would have received the premium in the KlimaFix tariff). As not even the household size could be obtained it was impossible to validate on a general level the third hypothesis. It is kept here as an

important hypothesis, that should be validated in further studies and as a hypothesis that could inform the qualitative evaluation, although the results of the qualitative evaluation cannot be generalized. The trends of the demand levels over the run of calendar years as well as over the run of years being customer of the respective contracts was evaluated to test the fourth hypothesis. For the fifth hypothesis consumer groups with different consumption levels (based on a study by EnergieAgentur NRW see Appendix A) were created and evaluated with regard to the years they have the contract and calendar years.

4.3.2 Data and Data Quality

For this part of the evaluation the utility company provided two data sets. One set consists of 26,257 electricity consumption bills between 2010 and 2014 of 10,112 customers of the KlimaFix-contract. As a comparison group, a dataset of 35,752 electricity consumption bills of 10,042 customers of the default contract between 2010 and 2014 were provided.

The customers of the default contract were chosen as a comparison group as they are assumed to care the least about their electricity consumption, because compared to default contracts generally more inexpensive contracts are offered.

Utility companies in Germany do not register the number of household members and additionally due to privacy legislation no socio-economic data could be obtained. The only additional information the company was allowed to provide was the postal code of customers. This is why only a descriptive statistical analysis could be carried out.

Due to a big variance and contracts that ended before the year was over, the datasets were reduced. Firstly, only bills for a whole year were counted. Although there is the option to extrapolate the consumption of the part of the year in which data existed, it was chosen not to do so because of seasonal variations in the consumption (i.e. higher consumption due to heating system in winter). For the KlimaFix-customers, bills with less than 400 kWh (5.0 percent of the cases) and above 12,200 kWh (2.0 percent of the cases) were excluded, because it is unrealistic that a private household consumes so little (extreme example in the interviews with 500 kWh, see below) or more than the level chosen (see interviews below, one case of more than 10,000 kWh was actually not one but a two-person and three one-person households and an office of a small engineering company). Same reason applies for the reduction of the comparison group where bills with less than 400 kWh (6.5 percent of the cases) and more than 12,200 kWh (0.002 percent of the cases) were excluded. This reduced the number of KlimaFix customers to 8,842 and the number of default supplier customers to 9,109.

Table 4 Statistics of districts where customers are living (source: Stadtwerke Heidelberg and (Stadt Heidelberg, 2014))

District	No. KlimaFix customers	No. Default supplier customers	Unemployment rate [%]	Living space per person [m ²]	Surcharge [%] on rental charges per m ² ⁷	Share of people age 18-29	Share of people age 30 - 44	Average electric energy consumption (in 2013)
Handschuhsheim	979	92	3.3	41.1	32.0	28.0	19.3	2304.85
Neuenheim	772	0	2.0	45.8	38.0	27.0	23.0	2450.43
Weststadt	753	162	4.0	38.9	30.0	25.8	25.8	2399.70
Kirchheim	725	2482	6.2	40.4	21.0	21.5	20.5	2445.65 / 2068.99
Emmertsgrund	191	1028	12.0	34.1	0.0	17.5	17.3	2451.11
Pfaffengrund	388	1236	6.8	37.4	14.0	18.7	18.2	2131.06

Table 4 shows some socio-demographic data that was obtained from the municipality. However, the municipality couldn't provide further data on district level about income level or highest educational achievement (personal telephone call and email communication). Nevertheless, the data obtained, gives some indication that districts, in which the highest numbers of KlimaFix-customers live are the ones with the lowest unemployment rates in Heidelberg, with high rental costs and a more living space per person. Additionally, these districts also have a high share of young population (18-44 years), which is possibly also caused by the fact that these districts are in near distance to the university. Thereby it can be assumed, that possibly KlimaFix customers are on average rather better off (can afford the high rents) and/or students, which can be assumed to be on average more interested in environmental issues (Borgstedt et al., 2011).

In contrast the dataset of the customers with the default supplier contract (selected by the company) are living in districts with higher unemployment rates, lower rental cost, smaller living spaces per person and a smaller share of young population. Additionally, the districts are farther away from the city center and the old town and the university.

These characteristics have to be taken into account when analyzing the data and the conclusions that are drawn from the analysis.

4.3.3 The Customer Interviews

For the inquiry of this thesis with the general question whether the financial incentive for the conservation of electricity was effective or not 12 problem-centered interviews with customers were carried out. In a meeting with two employees of Stadtwerke Heidelberg and the managing

⁷ Source: (Stadt Heidelberg - Amt für Stadtentwicklung und Statistik, 2013)

director of IFEU it was agreed upon that the utility company will send messages to a random sample of customers of the KlimaFix tariff asking whether they would be willing to be interviewed for the project. Thereby difficulties related to privacy issues can be overcome.

In order to explore the research question, related sub-questions shall be investigated by the interviews. These questions are presented below divided into three major parts. First of all, it has to be clarified whether the choice for the tariff was a conscious decision and whether it was chosen for the premium or for other reasons. Additionally, it is important to find out whether customers were initially informed about their level of electricity consumption. Related to this question is the aspect of potential changes in their perception and awareness of electricity consumption and energy demand in general.

The second major aspect that shall be investigated is whether and how the savings were achieved. Did the customers simply buy more efficient products? Was the particular year just one with a longer holiday? Or did they change consumption patterns, behaviors and routines? If the latter is the case, further implications are of interest, such as whether they believe these changes to be lasting. Did the raised awareness induce further and fundamental questioning of the life-style in relation to material consumption and environmental impact? Related to this question of behavioral changes and the concept of sufficiency is the question of whether individuals state a certain personal concept of what is enough, in this study particularly enough energy consumption. This could be shown through a personal threshold of a minimum or maximum, i.e. a lower boundary of the level of room temperature. The interview shall therefore also aim at finding out about consumer's self-assessment in relation to these boundaries, whether they see themselves consuming above or below their comfort zone. For the case that customers are consuming beyond their needs, the question is whether they would voluntarily reduce their level of consumption, and if not which incentives or constraints would stimulate a change. If their consumption level is low in their self-assessment it has to be clarified whether this is done voluntarily or caused by constraints.

Thirdly, the interviews shall reveal potential modifications to the tariff and additional measures that would help customers, independent from the question of whether savings were already achieved or not. The purpose of including the question of modifications is to find out whether another design would potentially increase conservation efforts. Potential modifications could be a premium per saved kWh, a higher premium or increasing premiums on a scale with continuous

steps (such as 5%, 10%...25%)⁸. Support options could influence the degree of savings or behavioral changes. It is therefore of interest whether customers received energy consultancy by the utility company, chose independently to receive an energy audit or received advice through other sources such as neighbors, friends or colleagues. Past studies show a better visualization of the electricity consumption through smart meters and displays have the potential to foster efforts and raise daily awareness, thereby potentially contributing to behavioral changes. Would customers in their self-assessment state that this would also influence their efforts for energy conservation?

One important aspect that will be difficult if not impossible to investigate is whether a rebound effect occurs through the saved money and the premium. To answer this question it can only be relied on the statements of the interview partners and it is questionable whether any valid statement is possible through self-assessment in this area.

4.3.4 The Qualitative Evaluation Process

In the following sections the interview process, some characteristics of interviewees and the analysis of the interviews is provided.

The selection of Interview Partners

The interviewees were selected in a self-selection process. The utility company sent out 250 letters to customers the 15 of July introducing briefly to the research project and asking for participation in an interview of 30-60 minutes. Vouchers for a local swimming pool were offered by the utility company for participants. In the letter options to reply were telephone and e-mail contact to the company, telephone and e-mail contact to the researcher and a reply form to be sent back to the company in order to give all customers the opportunity to participate. 10 customers replied to the letter of which eight took part in the interviews. One customer cancelled the interview due to health reasons; another one did not get back after the first contact via telephone. As most of the interviewees of this first letter did not know the premium (7 out of 8) and a majority of participants were women another letter was sent out the 9th of August to another 100 customers in order to check the validity of these first results. To this letter another four customers replied with which interviews were carried out in the second half of August, the low response rate is likely to be caused by the holiday period in southern Germany that starts at the end of July and is over in mid-September.

⁸ These modifications are derived from other premium schemes presented in Chapter 3 above.

The Interviews and Characteristics of Interviewees

The interviews were either carried out in the houses of interviewees or in the institute depending on the preferences of the participants to guarantee for a comfortable atmosphere. Exceptions are the fifth and the twelfth interview, which were carried out via telephone because no appointment could be done due to time reasons.

The interviews started with a short introduction of the research project, without mentioning the premium in order not to cause a bias. As a second point the interviewees were asked whether they would agree to the recording of the interview and anonymity was promised to them. To start the interview an open question was asked about the interviewee's degree of attentiveness to their energy consumption in order to get a first impression of the interviewee's attitude towards the topic and to make them talk. The questions of the interview guideline provided in Appendix D were used as a guide throughout the interview in order not to forget any topic. They weren't followed in the order as provided because during the interview interviewees came up with topics in the guideline by themselves. These were then explored in more depth before returning to the questions of the guideline. A large part of the questions could not be used due to the fact that interviewees did not know the premium and could therefore not be asked about strategies of how to achieve the goal of 15% savings or plans to achieve it. Furthermore, post-its with options for energy sufficient practices (i.e. a smaller television) that were developed in the research project were given to the interviewees with a graph (y-axis for the acceptability and x-axis for the frequency that this activity is done) during the personal interviews. With this task the interviewees were stimulated to think and talk about the options provided. The analysis showed that most interviewees prefer and already carry out most of common options (such as eco-programs in the dishwasher and the washing machine), but also revealed that options with sufficiency level three or four (in the ranking provided in chapter 2) such as no television or switching off the refrigerator in winter are rejected by the majority.

The findings for the quantitative analysis above showed that there is a tendency of KlimaFix customers to live in neighborhoods with higher incomes. This finding was also found with regard to the characteristics of interviewees that were collected with a short questionnaire at the end of the interview. The data is provided in Appendix X and is here briefly summarized.

One half of the interviewees were female the other half male. The households were in their majority one or two person households (only two families). The interviewees are of a broad range of ages from 32 to 79, with a tendency to above 60 (7 out of 12). Most of the interviewees have a

university degree (10 out of 12) and are rather well off (7 out of 12, two interviewees did not answer that question, have a household income above 3,000€). This is also reflected by the large living spaces of the households, with seven households with a living space above 50 square meters per person. The fact that four of the interviewees are either active or passive members of an environmental NGO shows the high degree of interest of at least a part of the interviewees in environmental issues. A further important characteristic is the fact that seven of twelve households had a below average consumption, with two households responding that they don't know their consumption. It is likely that these characteristics are more pronounced compared to the average KlimaFix customer due to the self-selection process. (Abrahamse et al., 2005) states that participants of studies in this realm generally tend to be highly motivated, have above average incomes and a higher educational level than the average. This has to be taken into account when trying to make generalizations based on these studies. Nevertheless, results from the interviews are assumed to represent KlimaFix customers on average because customers of the tariff have to consciously choose the renewable energy mix (including a higher price for the tariff compared to the conventional one) and as shown above are likely to have an above average income.

The Analysis of the Interviews

To analyze the interviews with the method of content analysis as described above, in a first step the interviews were transcribed topically after they were carried out. Secondly, the interviews were translated into English. In a third step, the quotes were paraphrased and for these paraphrases it was tried to create first generalization. Along the four general topics that are also present in the interview guideline – Characteristics of the Households, The Company and KlimaFix, Interventions and Politics –the paraphrases and first edition of generalizations were reviewed. To these paraphrases preliminary categories were assigned, that were further refined in the following process. During this process and the following review process the categories as well as generalizations were refined. In a third review it was tried to identify the similar and same generalizations as described in the theory above, these were then marked in the table (see Appendix E) which led to another refinement and changes. The generalizations were then summarized (reduction) according to the subcategories and generalizations were made accordingly.

4.3.5 The Expert Interviews

Three expert interviews of about 60 minutes were carried out to gain further insights into the topic. All three interviews were structured into three main topics: The Premium, further interventions for energy conservation and the political environment. The findings of the expert interviews were analyzed using content analysis along the three basic categories: The Premium, further interventions, the political environment. The quotes were translated into English and then summarized in the structure of these three main topics, with a focus on the expertise of each expert for the respective topic.

The first interview was done with Florian Unger, an employee of the municipality of Frankfurt, who is working in the department for energy. The interview was done after an expert workshop organized by dena (German Energy Agency) on the topic of energy conservation in households in June 2010. Florian Unger was chosen as an expert, because the municipality of Frankfurt has also a premium scheme for energy conservation in households that is now carried out for six years⁹ and has further initiatives to stimulate energy conservation of households. The inducement to interview Mr. Unger from the municipality of Frankfurt was to find out about the experiences with the premium scheme that was established by the municipality about 6 years ago within the campaign “Frankfurt spart Strom”. However, during the interview it was found out that the scheme is not evaluated yet wherefore no clear answers were obtained to major questions in the interview. Nonetheless, the interviewee provided a couple of interesting insights and ideas such as additional interventions but also the question why a municipality is active in a field that is also in the realm of utility companies and the determinants that contributed to the introduction of the premium scheme.

A second expert interview was carried out with Irmtraud Spinnler, member of the city council of Heidelberg for the Social Democratic Party (SPD) with a focus on environmental issues and public services. She was chosen as an expert to obtain the opinion of a local politician on the premium and gain insights in the determinants of policy making in the municipality (for successful policies) and in how far a municipal-owned company is part of a policy mix.

The third interview was done with Michael Teigeler, CEO of the Stadtwerke Heidelberg since 2008. During the interview some first preliminary results of the evaluation of the *Einsparbonus* were

⁹ The design of the premium differs from the one of Stadtwerke Heidelberg. For 10% of savings the citizen, who is applying for the premium, gets 20€ as a reward and additionally 10 ct for each kilowatt-hour that is saved beyond the 10%. Furthermore not only the demand of the previous year but also the demand of the year before is taken into account, to minimize windfall gains. Additionally the amount of money that is saved by consuming less kWhs (that means that is not spent) is emphasized in the campaign.

discussed. The focus of this interview was the premium scheme of the company, the reasons for introduction, goals that were planned to achieve and whether the politics of the municipality influenced the introduction. A minor topic discussed in this interview was about the additional interventions for energy conservation from the literature review.

4.4 Mixed Methods within the Study

A fully mixing approach is applied to completely assess the impact of the tariff and facilitate reasonable conclusions and recommendations for prospective sufficiency measures related to electricity consumption. Therefore, the research process was scheduled as followed.

The interview guideline and the questionnaire were developed in cooperation with the utility company and ifeu. The design and questions were partly informed by the analysis of the quantitative data, although it was tried to design the guideline as open as possible, which lead for example to the inclusion of many questions on how the savings goal was achieved, although the preliminary quantitative results already showed that the premium might not be successful. The interviews start with open questions on topics such as awareness to their electricity consumption, recent developments in the energy sector or related topics in order to stimulate the partners to talk freely. In the subsequent interview open questions were coupled with concrete questions of specific interest (reasons for choosing KlimaFix). As stated above, the evaluation of the quantitative data was carried out in parallel to the preparation of the interviews. The results of the evaluation thereby influenced subsequently the analysis of the interviews as the focus was shifted from measures that were undertaken to receive the premium to the perception of the premium and its potential modifications. Although, the results of qualitative interviews are generally not generalizable, for the discussion of the results it was assumed that to some extent some results of the interviews can be generalized as they are in line with the findings of the quantitative evaluation (i.e. assumed high windfall gains and the unwitting reception of the premium). Finally, the findings of the interviews, the quantitative data, and the expert interviews will be structured and conclusions drawn. In the discussion of the results, additionally, the insights from the literature are used to outline a sufficiency policy strategy in the sector of electric energy consumption of private households.

In short, the impacts on the individual customers are examined and combined with a quantitative macro-level analysis to fully account for all effects of the premium, draw the correct conclusions and give recommendations for prospective sufficiency policy approaches related to electricity consumption.

5 Results of the Evaluation

5.1 The Quantitative Evaluation

In the following section the results of the analysis of the consumption data of KlimaFix customers and the comparison group are presented starting with an analysis of the premium, trends in consumption levels and a differentiated analysis of consumer groups. The results are then summarized and hypotheses are developed that are then answered with the customer interviews.

5.1.1 The premium

The premium was paid 1,681 times in the past four years to 1,525 households, which means that it was paid 156 times to a household a second or third time. With the reduction of the sample, as described above, the first figure was also reduced to 1,297 times and the premium was paid to 1,192 households in this sample. This shows that 13.5 % of all customers (8,842 customers) of the tariff received the premium over the past four years. But it also shows that about one fifth of the premiums was paid to customers with a small share of total customers (ca. 5%), which were excluded due to very low or very high consumption levels untypically for what is considered a normal household.

For a first test of whether the premium was effective in stimulating energy conservation of households it was controlled how many times the premium would have been paid to customers with the default supplier contract. The results of the calculation show that 2,060 households saved 15% or more, which is 22.6 % of the whole sample. In total about households of the comparison group would have received the premium 2,198 times. This result is a first indication that the premium did not stimulate a significant number of households to save.

Therefore, the second hypothesis has to be rejected, as not only the difference between the KlimaFix customers and the comparison group is not significant, but the share of the comparison group is even larger, although these customers did not receive a premium.

Additionally it was tested for whether the conservation effect was lasting in the year after the premium was paid. Figure 9 shows the results of this test:

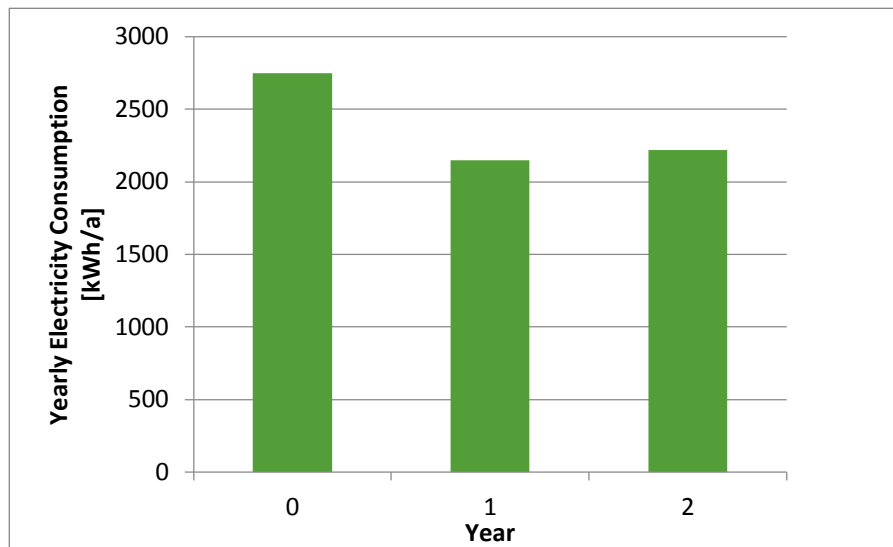


Figure 9 Consumption levels of customers in the years after receiving the premium (year 0 is the year when they received the premium)

Figure 9 shows that on average customers of KlimaFix raised their consumption level slightly in the year after receiving the premium (year 2). Out of the 469 customers that were considered here, 230 customers hold their consumption level or saved more while 239 raised their level again (for the remaining receivers of the premium no data was obtained for the year after receiving, due to ending the contract or the premium being received in 2013).

5.1.2 Consumption ordered by the years of contract

In Figure 10 it is shown that customers who had the KlimaFix-tariff for 3 years (3,097 customers) decreased their consumption over these years by -2.84% on average while customers of the default supplier tariff (6,100 customers) decreased their level just by -2.4% over 3 years. It is, however, also obvious, that the consumption level of KlimaFix-customers is on average significantly higher (about 250 kWh/year) compared to default supplier customers.

This fact can't be explained with the statistical data about the districts that was obtained, as the districts with more KlimaFix-customers are the ones with a higher share of single households, which would lower the average of all customers. This would mean that either KlimaFix customers consume more (because they can afford it) or because there is a higher share of bigger households in contrast to the statistical data of the overall district.

Figure 11 shows a similar illustration as Figure 10, just that here only customers are included which had the contract for four years. The fact that default supplier customers saved on average more (-7.1%) compared to KlimaFix-customers (-5.1%) could be partly caused by the smaller

sample size of the default supplier customers (338 customers compared to KlimaFix: 1,080 customers).

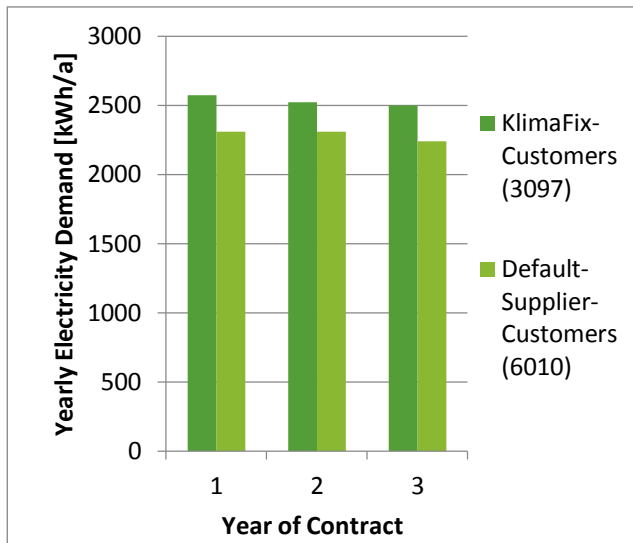


Figure 10 Electric energy demand by years within the respective contract (Sample only consists of customers having the contract for three years or more)

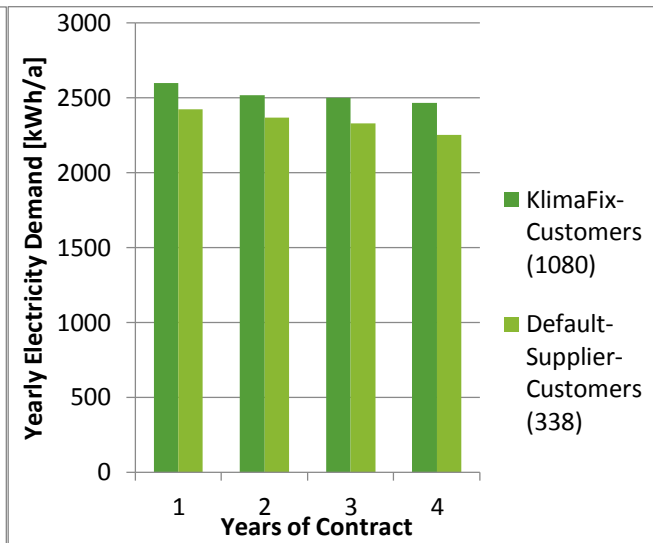


Figure 11 Electric energy demand by years within the respective contract (Sample only consists of customers having the contract for four years)

This calculation was done to validate hypothesis four, which is verified by the figures presented above. For the bigger sample the customers saved in the first year of their contract on average 1.84% and 1.02% in the second year, compared to the comparison group, which increased the consumption on average in the first year by 0.13% and decreased it by -3.18%. Similarly, in the smaller sample with customers that have the contract for four years in the first year the change in consumption level was -3.17%, -0.06% in the second and -1.40% in the third year (for the comparison group: -2.28%, -1.64% and -3.35%). However, it cannot be determined whether this effect was caused by the premium incentivizing customers in the first year to save more.

5.1.3 Consumption by calendar years

To control for yearly differences due to for example longer and colder winters consumption trends were evaluated based on calendar years. Because KlimaFix was offered from 1st of January 2010 this year was excluded because it would have shrunk the sample size. Only customers who had the contract in the years 2011-2013 are included in the evaluation in order to minimize disturbances due to customers canceling the contract or new customers within this period. The result is shown in Figure 12. It shows as in the evaluation above a higher average consumption level of the 2,623 KlimaFix customers compared to the 5,753 default supplier customers. For KlimaFix customers the figure shows a constant decrease of electricity demand in the period of the

3 years, while the default supplier customers raised on average their consumption in 2012 but then decreased in 2013. Over this period the average consumption of KlimaFix customers decreased by -3.01 % and by -3.07% for default supplier customers, compared to the consumption increase of German households of 0.6 % (statista, 2014). It has further to be noticed that the average consumption level is below the German average of about 3,000 kWh/a (bdew, 2013).

With these results and the ones above (consumption by years of contract) the first hypothesis, which states that KlimaFix customers save on average more compared to the comparison group (due to the premium), has to be rejected.

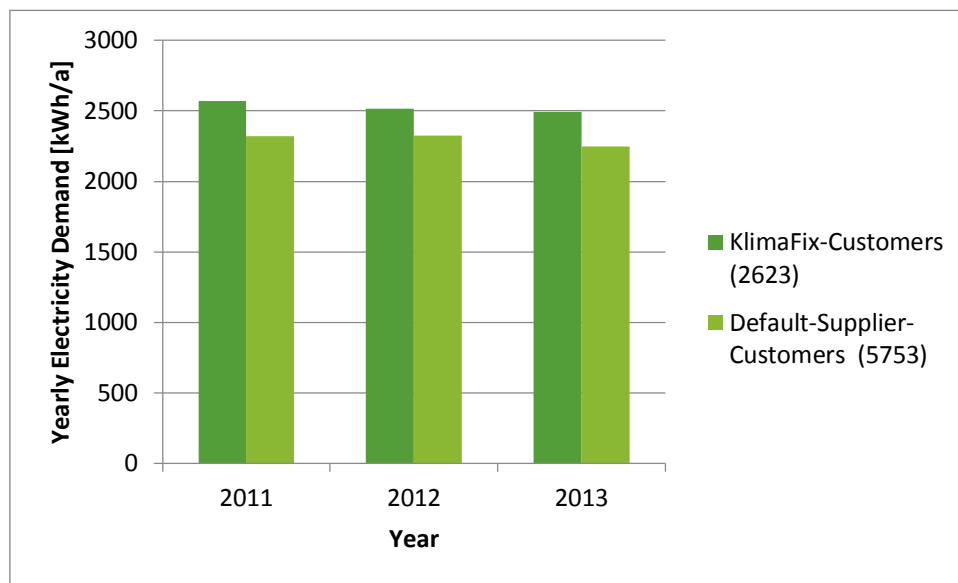


Figure 12 Electric energy demand by calendar years

5.1.4 Consumption by consumer groups

In Appendix A two tables provide an overview of the consumption trends of seven consumer groups with different consumption levels. The groups were created with figures of a study carried out by Energie.Agentur NRW, in which the electricity consumption of 380,370 households was assessed. With the figures provided (given with an upper level and a lower level for each household size) hypothetical households were created in the data sets. An additional seventh category was created for households with a very low consumption level (less than 1,500 kWh/a). The figures in the table show, that with the two data sets the third hypothesis, which says that a larger share of households with below average consumption are customers of the KlimaFix, has to be rejected. However, this conclusion has to be taken with a caveat, because these differences could be caused by socio-economic factors that differ considerably between the two data sets as described above. Additionally, the 'true' household size is not available. This entails that within the

group with a consumption level below 1,500 kWh could consist of 1-person households for which this consumption level is easier to achieve than 2-persons households, for which this level is significantly below average (for one of the interviewees this is the case). This means, that it could be that a larger share of KlimaFix customers with a 2-person household could be in the below 1,500 kWh group than in the comparison group. But also the reverse could be the case.

The fifth hypothesis can be confirmed for customers of both tariffs. Energy conservation of 'bigger' households is measured in percent of the initial level significantly higher compared to 'smaller' households. Actually, the groups with lowest consumption level consumed more (+ 3.0 % for KlimaFix, +9.85 % for default supplier group) while the groups with the highest consumption level (-3.0 % for KlimaFix, -10.0 % for default supplier group).

With regard to the higher savings of "larger" households it has to be noted that these could be caused by children moving out or elders that have to be cared for moving out, or (as mentioned in the interviews) a sublet apartment not (immediately) being sublet again after a person moved out.

5.1.5 Conclusion

In conclusion all of the hypotheses, except the fifth hypothesis, have to be rejected. This result indicates that the premium within the KlimaFix tariff does not incentivize the average KlimaFix customer to save more energy. A further indication for this finding is the large share of premiums paid to 'households' that were excluded because of the very small or high consumption level (about one fifth of all premiums were paid to these customers). There are various possible reasons that could explain this observation:

- The smaller percent differences in consumption levels could be an indication that the average household of KlimaFix customers is environmentally aware and therefore already exhaust a large share of saving potentials that could be influenced.
- The fact that a major share of KlimaFix customers live in neighborhoods of Heidelberg, in which the average population tends to be more wealthy, could indicate that the amount of the premium is too small for a rather high amount of savings.
- The same fact could also entail that the amount spent for electricity is rather low compared to the household income of the average KlimaFix customer, which causes that customers do not care too much about the electricity bill and their consumption level.
- The larger share of households receiving the premium received it rather by chance (i.e. people moving out, longer holidays, investments in efficient appliances) than consciously

intentionally, as they increased on average their consumption level in the year following the receipt of the premium.

These preliminary results and approaches to explain them are in line with the findings of the literature review in section 3.

5.2 Results of the Qualitative Evaluation

The results of the content analysis are presented in the following along the four main categories – characteristics of the interviewed households, the Stadtwerke and KlimaFix, Interventions and political environment - and then in a conclusion linked with the results and hypotheses of the quantitative evaluation above.

5.2.1 Characteristics of the Interviewed Households

During the interviews, but also when asked directly, many interviewees showed varying but high degrees of interest in environmental issues and their personal electricity consumption. A high degree of attentiveness to the electricity consumption was linked to:

- Intrinsic motivation to save energy (energy saving as a norm)
- Knowledge about saving measures
- membership in an environmental NGO
- Experiences of scarcity in the past
- Economic reasons
- General awareness for environmental issues

Intrinsic motivation was found when customers stated that it is a need for them to care about their consumption and not to waste energy. This was combined with emphasizing that it is a norm for them and/or that they have similar behavior for example related with recycling. Knowledge of saving measures means on the one hand the knowledge about concrete measures such as using plug bars but also on the other hand for example the use of ammeter (or at least the trial). Particularly the latter showed a high degree of interest in environmental and energy saving issues. But also several elderly interviewees referred to experiences in their youth associated with energy conservation. The experienced scarcity of the past leads to an appreciation of nowadays standard of living, with the appreciation leading to the need not to waste. However, also present economic constraints were mentioned during the interviews as reasons for the control of the own electricity consumption.

In contrast a reduced stated or observed attentiveness to the own consumption was firstly almost not present during interviews but when linked to:

- Missing means or incapacity of controlling the own consumption
- The attitude that “big” consumers such as industry would waste much more than the own consumption is negligible
- Association with energy saving to restraint

With regard to the division of labor in the households the interviews showed that the labor is prevalently done by women for older interviewed couples, when the children were still at home, when living at home. The labor is done by men when living alone or when he is the one spending more time at home. Homework was shared by younger couples and couples after their children moved out.

The division of homework was in many cases linked to the influence when deciding on new appliances as he or she is the one that predominantly uses these appliances. However, in some cases if the person with minor influence was the one caring more for energy consumption it was stated by interviewees that this person influences the decision towards higher energy efficiency. Another factor influencing the decisions, which was mentioned by elderly couples, was the experience of durability and quality with regard to certain manufacturers.

All interviewees knew the energy efficiency label and stated that it is used to inform their decisions. The information about new products when buying appliances was in most cases at the point of sale. Secondary sources were print media and the internet.

Most interviewees try to limit or reduce their electric energy consumption to varying degrees with a range of options mentioned during the interviews. It was not possible to categorize these in more detail as there were differences in the measures done by interviewees and activities done by the wife/husband for most of these options. Options mentioned most frequently were:

- Switchable plugbars for stand-by appliances
- Eco-programs in dishwashers and washing machines
- Investment in energy efficient appliances
- Foregoing a dryer
- Foregoing a freezer (or even a refrigerator)
- Investment in induction or gas stove
- Early regulation of stove temperature

- Giving advices to others (neighbors)

The investments in energy efficient appliances are dependent on the income of households and the willingness to exchange old (still working) appliances with energy efficient ones. Particularly, with regard to the second point there were large differences between interviewees. One interviewee said that all older appliances were exchanged in the last year in order to have more energy efficient ones. In contrast, another interviewee mentioned with regard to a 30 year old freezer, which is still working, that she was not sure whether it would be reasonable to exchange or not.

5.2.2 The Stadtwerke Heidelberg and KlimaFix

During the interviews most customers expressed appreciation of the company independently from the tariff. Particularly the good service of the utility company was emphasized by many customers. Furthermore the proximity of the company and customers' bonds to the city and a resulting obligation to support the local company were expressed. Linked to that, it was mentioned that the company is still perceived to provide public services and appreciation of former municipal companies.

That is why many of the customers interviewed were customers of the company before and were informed about KlimaFix by the company with a leaflet that was received with the yearly bill. Other sources of information were the internet, poster advertisement and direct consultation by the company.

The reasons for choosing KlimaFix were either the renewable electricity mix or characteristics of the company mentioned above. The question addressing the reasons for choosing the tariff was thought to be a first test of knowledge about the *Einsparbonus*. However, none of the interviewees mentioned the *Einsparbonus* when asking for reasons for choosing the tariff. Further criteria for choosing the tariff were:

- Electricity from a hydro power plant
- proximity and company's connection to the region
- the service
- price stability
- electricity generation is not harming the environment
- support of the local environmental NGOs

- the energreen¹⁰ tariff
- the loyalty and year-long connection to the company
- Economic criteria
- the overall concept of the tariff

In the case of couples, the decision for the tariff was done in most cases jointly. Reasons for no joint decisions were the fact that one person in the household is responsible for financial concerns or the deciding person caring more than the other for environmental issues. Most customers have the tariff since its introduction in 2010.

With regard to the additional offers of the company such as the *Energieladen*, which is a service center in the shopping area of Heidelberg, the interviewees did often not know about these or when they knew about these they did not use the offers. Nevertheless, most interviewees appreciated the engagement of the utility company and after being informed about were interested in the offers.

Related to the *Energieladen* the interviewees knowing it stated that they:

- Did not visit it
- Did not know what is offered there
- Did visit it but did not understand why the company established it and what it is for
- Do not feel addressed by it, but think it might be useful for others
- Did mention a rumor about a lack of competence

Customers who did not know the *Energieladen*:

- Are interested in it
- Said that the company should inform the customers better (local newspaper)
- Did appreciate the engagement

All customers did not know about the *Effizienzshop*, which is an online shop of the utility company for energy efficient products that can be found on the homepage of the utility company. But when informed about the existence, they were interested in it and demanded more advertisement and more information about it.

¹⁰ A tariff in which the customer pays an additional amount (1-4 ct/kWh). The money is invested in photovoltaic systems in the region of Heidelberg by the company

With regard to additional offers such as the exchange of a circulation pump of the heating system or a voucher for a pedelec the interviewees welcomed these offers and think that they contribute to making people to think more about their energy consumption.

But customers state that:

- they are not targeted by the offer (no own house)
- there should be offers for other target groups
- they want offers for energy efficient appliances
- questioned the voucher for pedelecs

The product Heidelberg Green was known only by few customers and only few were interested to buy it, although it is supported by most customers.

Customers that don't know about Heidelberg Green:

- are interested in it
- think they already are customers of this offer
- reject it and demand that all customers should pay for new power generation capacities
- know that the company is active in this field

Customers who are not interested in Heidelberg GREEN:

- have other priorities to spent their money (donation to NGO)
- have a negative image of photovoltaics
- have a limited budget

Although the *Klimabonus*, which is a donation by the company to a regional climate mitigation fund, is only known by a part of the customers, it was generally very positively seen and appreciated that the company supports thereby projects by regional environmental NGOs.

In general the environmental engagement of the company is very positively assessed. Some interviewees gave recommendations for an improvement of the engagement such as including other renewable energy sources in KlimaFix (wind or solar), doing an energy saving campaign in the newspaper or vouchers for energy efficient appliances (the existing vouchers were not known).

5.2.3 Interventions

In the interviews the focus was on the *Einsparbonus*, interviewees' perception of the premium and questions on the measures taken in order to receive the premium. But, on the one hand

interviewees by themselves talked about other needs or options that would help them and on the other hand it was also tried to incorporate questions on other interventions that were discussed in chapter 3.

The Premium

Level of Awareness

Most interviewees did not know about the premium within their electricity tariff (10 out of 12). The remaining two customers only mentioned their knowledge about the existence only when asked directly about it. With one interviewee just stating that the premium is known and the other stating that he did not feel addressed by the premium, because of the already very low consumption level.

The other customers stated they could have been informed about the premium when informing themselves about the contract, but that the premium is too low to attract their attention, which is the reason why they probably forgot about it. For one customer it was found out during the interview that the premium was received, although she did not know about it. In this case the reason for not knowing the receipt of the premium was that the interviewee stated to have only read the first page of the bill as it is difficult for her to understand the bill and the first page shows the most important information. However, the premium is only listed on the second page where a detailed breakdown of all positions is presented. The information of the other receivers was provided by the utility company. Two of the other receivers were well informed about energy conservation and with regard to the company. They stated that they see no potential to reduce their consumption in the magnitude of the goal, because they try to limit their consumption anyway independently from the premium.

Motivation due to the *Einsparbonus*

Although most of the customers did not know about the premium, either they talked about their motivation due to the incentive without being asked or they were asked whether they are stimulated after being informed about the premium.

A few customers admit that the *Einsparbonus* is a potential motivation for them to save, but that they would just intent to achieve the goal as a kind of a sportive challenge and not in order to receive a reward because they were motivated anyway.

The majority of the customers, however, were not motivated by the *Einsparbonus* due to a variety of reasons. They state that:

- they see no further saving potential in their household as energy was saved independently from an incentive
- the premium is too low
- the goal is too high
- the (high) effort to achieve the goal is not adequately rewarded by the premium
- they are already intrinsically motivated
- monetary incentives are in general not of interest for them and have a negative image
- the premium is too low to stimulate investments in energy efficient appliances

General Assessment of the *Einsparbonus*

Interviewees assessed the premium independently from the condition in their household or were asked during the interview about their perception with regard to effects on other citizens. Most interviewees welcome the premium:

- because customers are in favor of energy conservation
- because it could stimulate others to think about their electricity consumption
- because monetary incentives could stimulate other people
- because monetary incentives could work for stingy people

However, problems that are seen with the existing premium are that:

- the attractiveness of the premium depends on the personal income
- premium is too low to attract attention
- the high goal is discouraging
- the reward is too low
- is automatically paid although consumption reduction could be caused by an increase in energy produced by an owned photovoltaic system or a mild winter

Two interviewees did assess the premium negatively because:

- industry not private households should save more
- people are not willing to forego their luxury
- consciousness for the topic is missing (premium is not effective)

Recommendations to improve the *Einsparbonus*

Interviewees thought about potential improvements of the premium schemes when talking about the premium and were also asked directly what they would recommend to increase the

attractiveness and visibility of the *Einsparbonus*. The following changes are recommended by the interviewees:

- Increase generally the visibility of the premium
- Couple the program with SmartMeters and or energy audits in the house of customers
- Voucher as an alternative to the credit on the bill
- Increase the premium (50-100€)
- Increase visibility of customers who receive the premium
- Exemplify the amount of savings
- Advertise the premium with ammeter-lending
- Introduce an application to receive the premium
- Tiered model with higher premium
- Lower goals
- Joint leaflet with all bonuses and premiums within KlimaFix

The answers reflect the assessment of the premium done before as one of the improvements most demanded is an increase in visibility of the premium. Additionally, an increase of the premium was one of the most demanded improvements that is not reflected in a variety of recommendations as statements with this demand were summarized in one generalization. Most interviewees besides the motivational effect also linked the amount of the reward to the visibility, as the current reward is too low to attract their attention. Furthermore, the recommendations reflect the need for feedback and more information about additional measures to save (“exemplify the amount of savings”) because most interviewees did not know the magnitude of measures that would be necessary to achieve a 15 % reduction.

Further interventions

As stated above customers expressed in the interviews the need of an easy to understand feedback to control their consumption and sequentially also to achieve the goal of a premium scheme. Four customers excluded some feedback options or stated that they do not need a feedback because:

- They are already controlling their consumption level, but observe a need of other people for more feedback
- They know about the option to measure with a ammeter and state that they could measure with it if necessary
- They think the yearly feedback is sufficient

- They would appreciate a real time feedback but reject more frequent bills

Others in contrast stated that they would welcome a smart meter feedback on an in-home-display because it facilitates control in a comfortable way. Currently the electricity consumption of these households is not controlled because going down the cellar is perceived to be too much of an effort.

Similarly a feedback in form of a monthly invoice via e-mail was demanded by some interviewees, as it would leave it up to the customer to read the e-mail or delete it without reading it. Others preferred a bill twice a year to control seasonal differences and increase the consciousness for the topic.

However, some interviewees (four) also assessed feedback (in form of bills/written feedback) in this form negatively, because:

- They think, the feedback wouldn't change their behavior
- Is too much to read
- It would not help because of seasonal differences and an overview at the end of the year with monthly figures would be better.

Some people also thought a web platform could be a service of the utility company that could influence the electricity consumption of people. They stated that it would be a comfortable option to inform themselves and because of the affinity of younger people to web applications it could help to increase the consciousness of this group.

This shows the need of interviewees for more frequent, whereas the existing feedback that is presented on the yearly bill was not known by many interviewees. This feedback was introduced by law in Germany the 4th of August 2011¹¹. It contains a bar chart of the electric energy demand of the past and the previous year and the average consumption of various household sizes to allow customers to compare themselves with the average.

The few interviewees who knew about this kind of feedback stated that:

- They use it to control and compare their consumption with the average
- It could be very effective, because people who don't care about their consumption are startled by it

¹¹ The amendment in the Energiewirtschaftsgesetz implied in § 40 paragraph 2 EnWG that a graphic illustration containing the current electric energy consumption level, the level of the previous year as well as average values of various household sizes on the yearly bill.

- It should be made more visible (i.e. more colorful, with colorful clues on the first page of the bill) in order to be effective

The rest of the interviewees:

- appreciate it and claim that this new form of feedback is useful for them
- demand an enhanced visibility of this feedback
- state that the bill is too difficult to understand and too long as reasons why this welcomed feedback is not known

The interviewees were further asked about their perception of existing offers of energy audits in Heidelberg as another support measure for energy savings.

They claimed, that energy audits:

- could support people saving electric energy
- are seen as a measure of last resort
- are unnecessary for appliances, that means electric energy consumption of households
- are not visible enough
- should be more advertised

With regard to structural changes in support for energy conservation some interviewees mentioned ideas such as a linear tariff or quotas by themselves during the interviews. However, to most interviewees the idea of a progressive electricity tariff system had to be introduced. With regard to such interventions they expressed:

- that quotas could be effective, but are negatively assessed because these are perceived to be a too compulsory measure
- that progressive tariff schemes are effective, but could be unjust
- that progressive tariff schemes are a compulsory measure but more effective compared to the premium
- that households are the wrong target group and industry should pay more
- that other tariff schemes would be effective but disciplining/interfering with peoples private sphere
- that a linear model is preferred over a progressive model

5.2.4 Politics

As in the expert interviews below also the realm of politics was a topic of the interviews. While particularly national politics was often mentioned in interviews without asking questions on it, municipal politics was also partly directly addressed by the interviewer, when asking about reasons for the company to introduce the premium.

Municipal Politics

With regard to municipal politics first of all interviewees generally assessed initiatives and engagement of the municipality of Heidelberg positively.

- should use the company and shape conditions
- should steer the company
- see it as an advantage that the company is owned by it
- should do more for energy conservation
- should improve the coordination or joint initiative for energy audits

Negative statements with regard to municipal politics (from two interviewees) were, that the municipality should rather care about other issues (such as wider lanes for bicycles) or should not address energy consumption of households but energy demand of infrastructure (streetlamps and traffic lights) and industry.

National Politics

National politics is almost in all statements negatively assessed with regard to energy conservation, although some interviewees also addressed the renewable energy legislation and criticize it with regard to a lack of coherence.

Other interviewees point at the responsibility of big consumers (industry) and that politics should address these instead of private households. However, referring to national politics mistrust and the weakness of politicians was expressed in interviews.

In order to foster energy conservation interviewees said that the topic should be more present in media and daily politics to increase the consciousness for the importance. It was emphasized that the issue has been more present in the past, but that energy conservation is associated with restraint in contrast to efficiency which is why it is less popular.

5.2.5 Summary

Summarizing the results presented above it can be stated that households interviewed declare that they are already intrinsically, that means without an external incentive, trying to save electric

energy to varying degrees and with a wide range of measures. It might be that the households interviewed are at least partly above average motivated compared to other KlimaFix customers as the literature suggests that households participating in studies of this kind voluntarily are generally highly motivated. However, as the interviews also showed the main reason for choosing the tariff was the fact that its electricity mix comprises only renewable energy, which was emphasized by all interviewees to be the most important criteria. This shows that the decision process when choosing KlimaFix was consciously done and KlimaFix chosen for environmental reasons, which is why it can be assumed that most KlimaFix customers in general are to varying degrees environmentally aware and therefore could be assumed to be more aware of their electricity consumption than the average citizen (see Chapter 3, environmental awareness and intrinsic motivation to save electric energy). With regard to the premium it has to be stated, that it was largely unknown to interviewees and did not incentivize them after being informed about for various reasons. But it was emphasized that the premium could potentially stimulate “others” to save and was generally welcomed as a measure for energy conservation.

Based on the analysis of the interviews the hypotheses that were formulated after the quantitative evaluation can be confirmed:

- The smaller percent differences in consumption levels could be an indication that the average household of KlimaFix customers is environmentally aware and therefore already exhaust a large share of saving potentials that could be influenced.
- The fact that a major share of KlimaFix customers live in neighborhoods of Heidelberg could indicate that the amount of the premium is too small for a rather high amount of savings.
- The same fact could also entail that the amount spent for electricity is rather low compared to the household income of the average KlimaFix customer, which causes that customers do not care too much about the electricity bill and their consumption level.
- The larger share of households receiving the premium received it rather by chance (i.e. people moving out, longer holidays, investments in efficient appliances) than consciously intentionally, as they increased on average their consumption level in the year following the receipt of the premium.

Although some interviewees also tried to save energy due to financial constraints, interviewees confirmed that they regard the premium as too low. Some also compared it to the overall bill and their income to emphasize that the existing premium does not stimulate them to save energy.

Nevertheless, most households intrinsically try to minimize their consumption already, part of them has the budget to purchase appliances of the highest energy efficiency class and most households interviewed have already a below-average consumption level.

Furthermore, it can be confirmed that households receive the premium unwittingly, as even households with an high degree of affinity to and interest in the topic (particularly household 6 and 7) received the premium although stating the opposite during the interviews and even emphasizing that they believe that a goal of that magnitude could not be achieved by them.

Further changes in framework conditions such as more frequent feedback could potentially stimulate energy conservation behavior of the interviewees more than the current premium. Only an increased premium could incentivize particularly the KlimaFix households with less income to save more as it could potentially stimulate investments in energy efficiency.

The utility company is in general highly appreciated as a local institution that acts in the public interest, while the additional services such as the *Effizienzshop* are little known, although there is a potential interest in these services. With regard to additional voucher or offers such as the one for the exchange of the pump of the heating system the interviewees did not feel addressed. This might, however, be due to the small sample. A larger questionnaire survey could address this question leading to improvements in this area.

With regard to politics, the interviewees expressed that they would welcome a policy formation using the local utility company to change framework conditions. Nevertheless, problems in this respect were addressed in a couple of interviews concerning EU-legislation and the financial resources a private profit oriented company can spent for additional measures. Municipal politics in the environmental realm was generally positively assessed only with some interviewees stating a still unexploited potential for improvement. National politics when addressed in the interviews was in contrast rather negatively assessed with a large potential for energy conservation as the topic is perceived to be underrepresented compared to other issues such as renewable energy legislation.

5.3 Results of the Expert Interviews

Three expert interviews were carried out to gain additional information and in depth insights on the options of municipalities to shape framework conditions for energy sufficiency, the options but also limitations of municipal power suppliers and municipal politics to influence and shape policies and framework conditions. The first interview was carried out with Florian Unger, who works in the energy department of the municipality in Frankfurt. The municipality carries out various projects to stimulate households to save energy from campaigns for the youth organizing concerts to a premium for electric energy conservation similar to the one by the Stadtwerke Heidelberg. The second interview with Irmtraud Spinnler was aimed to gain insights in municipal politics in Heidelberg and options of shaping framework conditions in cooperation the municipal company. A third interview was done with Michael Teigeler, CEO of the Stadtwerke Heidelberg, to obtain more information on goals and the idea of the premium, the political environment and further measures the utility company could initiate.

While the general topics – The *Einsparbonus*, political framework conditions, and further interventions – were part of all three interviews, it was chosen to discuss the results of the interviews separately for each topic and interview partner to improve the structure, because the subthemes and ideas of the partners varied considerably.

5.3.1 The *Einsparbonus*

Mr. Teigeler states that the idea of the premium is to make customers realize the potential to save, although this is not emphasized in the campaign for the premium with an exemplified calculation of the monetary amount that an average households saves when reducing the demand by 15% (“the 15€ is just the icing on the cake”). The premium was introduced by the utility company with the assumption that 20% of all customers could potentially receive the premium. The evaluation above showed that this figure is reasonable insofar as about 22% of the default supplier customers and 13.5% of KlimaFix customers achieved the goal of 15% demand reduction. However, this assumption shows that no additional incentive due to the premium was assumed when introducing the premium as the share of potential receivers is equal to the share of customers that reduce their consumption by chance 15%. Additionally, Mr. Teigeler stated no overall goal – that means a reduction goal for KlimaFix or all customers of the company higher than the average reduction – that was aimed to achieve with the premium although he was asked by the interviewer. The “boni” are thought to increase the attractiveness of the KlimaFix-tariff (“[...] what is special in this tariff: the two boni”).

With regard to changes in the premium scheme technical difficulties in the introduction phase of the existing scheme were emphasized. Due to legislative requirements the electricity bill for German households has a length of about 5 pages, which results in overtaxing for many households and that households do not read the bill completely. Therefore, it is questionable whether it is a promising option to recommend significant changes of the way how to inform customers within the existing premium scheme. In contrast, the option of an application for the premium was assessed more practicable in this respect, because other communication channels could be used to inform customers about the reception of the premium (i.e. via e-mail or a separate mail). However, it is difficult for the company to decide for a certain channel because of the broad spectrum of customers with the younger generation being more net-savvy than elderly.

Mrs. Spinnler, as a citizen of Heidelberg, is also customer of the *KlimaFix* tariff, but did not know the premium. She only cared for renewable energy when deciding for the contract and the program was not discussed in the council. She perceives the goal difficult to reach and the reward not adequately high to stimulate the significant changes that would be required (“they could make more out of it”). First of all she recommends sending out quarterly invoices to inform customers about their consumption level, because if they set themselves the goal it provides an additional stimulus to check their current point of achievements. Additionally, the invoice is seen as requirement for such a challenge because the customer needs to be enabled to control whether alternations are already or if not whether the effort needs to be increased.

Apart from that, the premium scheme would need more advertisement on prominent pages in the newspaper to inform customers. Alternatively the premium scheme could be modified with a costly price (i.e. a cruise) that is raffled among all who reached the saving goal. But, though giving these recommendations, Mrs. Spinnler doubts the importance of the premium scheme. It could be more important to convince more people to take *KlimaFix* or another renewable tariff instead of having a saving premium for already environmentally conscious citizens.

As stated above no evaluation was done on the premium scheme in Frankfurt wherefore the insights on the scheme in Frankfurt are limited. For example, no information could be obtained about the receivers of the premium and the measures they took to receive the premium. Mr. Unger called the premium a sufficiency instrument during the presentation he gave in the workshop, but stated that receivers could also just have invested in energy efficiency. The windfall gains are expected not to exceed 10-20% of the overall receivers of the premium, although the recipients are checked thoroughly in contrast to the scheme of the utility company. The applicants

have to provide two bills previous to the year of application and in case of doubt the employees ask for the measures that were undertaken to reach the demanded reduction. As in the case investigated in this study, some household could even receive the premium twice or three times (150 or 170 of 850, ca. 17% of all premiums paid). The fact that this is about the double compared to the share of premiums paid twice or three times in *KlimaFix* (ca. 8%) might be caused by differences in the schemes, such as that citizens in Frankfurt have to actively apply for the premium while in Heidelberg the premium is paid automatically. The total recipients represent only one percent of the population of Frankfurt, with only 13 percent of the citizen stating that they know the premium program (in a representative survey). The only modification in the premium scheme that is planned for the future is to increase the premium, but only in the case that a monitoring scheme is introduced to supervise whether the reduction is sustained in following years. With regard to the rebound effect Mr. Unger doubts whether there is a direct rebound effect on household level as he observes a high degree of endowments in electric appliances and questions whether households would buy more. However, he admits that there could be a rebound effect on the macro-level caused by investments in leisure activities. Therefore, he presented the idea of a research project in which the premium is not paid directly but in a kind of local currency which can only be spent in regional and sustainable businesses to limit or prevent the rebound effect and foster the regional economy.

5.3.2 Further Interventions

The additional interventions that were also part of the customer interviews and the literature review were also partly addressed in the expert interviews to varying degrees. With regard to an increased visibility of electricity consumption, Mr. Teigeler emphasized in the interview the importance of smart-meters. However, to date, smart-meters are still a niche in Germany. Nevertheless, Mr. Teigeler pointed out that there is the option for customers who are interested in it to take a tariff that includes smart-meters¹². For energy consultancy it is observed that the demand is still below the offered service capacity, which is the reason for a training of employees in the *Energieladen* to approach customers more directly with the consultancy and to work as “pilots”. The in the customer interviews stated problem of difficulties to identify the correct company for the energy audit or consultancy shall be solved with a pilot function in the background that directs citizens to the correct service partner. Therefore, in his opinion, no coherent campaign with a central coordination of services is required. With regard to the

¹² However, these tariffs are generally more expensive due to the additional yearly costs for the meter

information about the consumption level and comparable average values that is provided on the bill, Mr. Teigeler states the problem of the complexity of the bill that was also emphasized in the customer interviews.

To improve the visibility of demand, Mrs. Spinnler would require quarterly information about the demand level that could be provided online. In general, she is optimistic that citizens can be incentivized either by competitions or monetary incentives to control their demand, although she admits that she would not react to such incentives. For the problem of a low demand for energy consultancies the concept of a consultancy by neighbors within the association Obdach e.V. in Heidelberg was introduced. A formerly homeless person was trained as an energy consultant and carries out audits in flats of other persons that are in the program of Obdach e.V. Discussing the idea of the activation of social norms through comparative feedback Mrs. Spinnler stated that the idea of a smiley could be problematic and that it could be left to the responsibility of the individual whether to use the information provided or not. Apart from the interventions discussed up to now in this thesis, Mrs. Spinnler introduced new ideas that were tried in the city of Tübingen. Employees of the local utility company come to the houses of customers to read the meter for the yearly billing. Besides that the employees offer the customers to measure the electricity demand of their refrigerators to give recommendations on the purchase of new devices with a higher efficiency standard. While in this format it is only an efficiency instrument, it could be easily complemented with energy sufficiency for example by giving recommendations on the size of the new device. Additionally, Mrs. Spinnler emphasizes the responsibility of the local environmental NGOs that benefit from the *Klimabonus* to advertise the tariff in order to reach more citizens of Heidelberg.

Confirming the statement of Mr. Teigeler above, also Mr. Unger points out that demand for energy audits is lower than the offered service capacity. As an example a mailout for an energy audit for free during a campaign on neighborhood level is mentioned that resulted in a feedback ratio of about one percent. But in contrast, when asked whether they know the offer of a consultancy for free of the city of Frankfurt in a representative study, 60% state that it would be known, although the offer does not exist. He emphasizes that sufficiency advices, such as questioning the necessity of a dryer, are included in the audits carried out currently. However, the low response rate might be a sign for the seemingly banality of the problem of energy conservation, for which the only solution might be the sensitizing of people as imposed measures are less effective in the opinion of Mr. Unger. But a measure such as neighborhood energy

consultancies that could lead to higher response rates are seen rather problematic, because the consultants in such programs are less trained than professionals, which might cause problems with regard to ensuring the service quality. Nevertheless, there might be the option to introduce such a scheme within the e-club in Frankfurt when the program is established. When discussing this problem another problem was again mentioned – as in the literature review above – namely, that the “normal” population is not represented in research projects on energy conservation. Referring to an energy neighborhood of the EU Mr. Unger emphasizes that it was found out only university graduates that are enthusiastic about these topics took part in the project. With regard to a progressive electricity tariff Mr. Unger points out that the introduced premium scheme was thought to be a kind of reversed progressive tariff. But it seems to be too abstract for people to understand the idea and how the scheme is working. Therefore, rising prices might be a measure to make the behavioral costs of wasting electric energy visible to the citizens, because informative measures such as leaflets do not have an effect without an additional motivation (either extrinsic or intrinsic, see above chapter 3). In contrast to the other two experts interviewed, Mr. Unger mentions the option to activate social norms and to activate citizens by social pressure. He is convinced that this is a promising way for example by teaching kids to be energy caretakers in their family households, citing a study that showed significant savings in schools by sensitizing kids. Based on this experience he is convinced the example could be even expanded to an energy caretaker for bigger housing units.

5.3.3 Political Framework Conditions

With regard to political framework conditions and the influence of these on the introduction of the premium, Mr. Teigeler mainly talked about the price and cost structures in the electricity sector. In his opinion, the framework conditions need to be adjusted in a way that they are no longer intrinsically (for business reasons) interested in selling larger and larger amounts of electric energy by removing the business risk of selling smaller amounts of electric energy. Thereby, the suppliers would be enabled to influence their customers to lower consumption. He claims that the major costs in the electricity sector are rather fixed. Hence, he argues that already nowadays the amount of sold kilowatt-hours is less important than the flat rate price customers have to pay. The main cost element in the price per kilowatt-hour is the network cost, which is already paid in other countries by a flat rate per household. In his view, in the current German debate there is a tendency to change the system towards such a system, which would be a first step towards lowering the pressure to sell more. The premium represents for Mr. Teigeler a door-opener

towards a system in which companies are not interested in selling larger amounts anymore. However, he states, that it will be a difficult process as, in his view, politicians, competitors and customers would need to understand the reasonability concurrently to allow the adjustment in framework conditions to be introduced. Although this appears to be a difficult process this could lead to a structural change such as a progressive price structure.

Apart from these adjustments in national framework conditions, Mrs. Spinnler remarked that the municipality passed the aim of a reduction in energy consumption of 25%¹³. This aim also obliges the local utility company to contribute to this goal. Therefore, she presumes the premium scheme to be one option the utility company chose in order to achieve this goal. However, besides this aim, the municipal council could be in her view better informed about the activities of the company and has barely an influence on it. The council has several sub-committees that could potentially require the company to present a new proposal for an energy conservation program. This would, however, require the initiative of members of the committee. The council members with the highest potential to influence the company's politics are the members of the board (i.e. the mayor). The members of the board receive a report on the activities and could exert influence. However, Mrs. Spinnler points out, that a devoted mayor would be required in her opinion to actually realize considerable changes conjointly with the company. The role model for her is Boris Palmer, mayor of Tübingen, who initiated a successful campaign in the city conjointly with the local utility company. Mrs. Spinnler talked about the plan to initiate a campaign inspired by the model of Tübingen in Heidelberg, but the initiative failed in her opinion as too less people within her party devoted their time towards this issue. This shows in her opinion that it depends on the one person who dedicates himself to the topic of energy conservation in order to introduce changes in local framework conditions towards energy conservation. Asked about how the introduction of such conservation programs could be decoupled from the leadership of a single person Mrs. Spinnler proposed a framework analogous to the cycle-friendly city in Baden-Wuerttemberg. When the city of Heidelberg applied for the program tasks related to the cycle-friendliness, such as the width or construction of new bike-lanes, were transferred to the administration. To her observation, now issues in this realm, such as decision processes and the introduction of new measures, are carried out faster and more efficiently.

In contrast to this view, in which the local utility company is an essential part of a conservation campaign, Mr. Unger doubts that energy conservation is a task for utility companies, probably

¹³ No source was found after the interview confirming this goal

because of the perceived conflict of interests that was also discussed by Mr. Teigeler (see above). He points out that the introduction of measures for energy conservation began with the development and design of municipal climate mitigation plans in Germany. However, in his observation, the issue is still little addressed because municipalities are still struggling with other tasks. Therefore, clear responsibilities on all governance levels are required to foster initiatives. On the local level municipalities interact and agree on responsibilities with other local actors on measures that shall be introduced. The provinces would in the ideal case support municipalities in their endeavors, which is already to some extent done, by providing expertise and for example supportable framework conditions, as the program presented by Mrs. Spinnler. Mr. Unger claims that the most effective measures and instruments are already known, but these need to be transferred to the responsible actors and applied by them. On the national level the overall goal would be supervised and favorable framework conditions applied. The EU would then determine goals and directives for the introduction of respective measures. However, to date also in Mr. Unger's observation activities on the municipal level are driven by individuals. He emphasizes that in the case of Frankfurt "the right person [was] at the right place at the right time", which lead to the ambitious program of the municipality (besides favorable budgetary conditions). Although, he sees, Frankfurt at the forefront, there is still a large potential and the EU goal of a three percentage increase in efficiency was only achieved in 2010 with the budget of the investment program of the national government.

6 Discussion

The results presented in the previous chapter are discussed in the following and the premium is evaluated with regard to the sufficiency literature introduced above. Furthermore, recommendations for the premium as well as an outline of optional changes in framework conditions for energy sufficiency are presented.

6.1 Assessment of the Saving Premium

Although about one half of all receivers of the premium on average sustained their demand reduction in the year after the premium was paid, the quantitative evaluation showed that the *Einsparbonus* did not lead to a significant change in the overall consumption level compared to the comparison group. The premium was paid in total 1,625 times. But compared with the results of the comparison group with an even higher share of customers saving 15 % or more without receiving a premium and the results of the interviews – the premium widely unknown, the receivers not knowing about that the premium was received and interviewees widely not feeling motivated – it has to be assumed that the average customers' consumption practices were barely influenced by the premium. No significant differences comparing the trends of the demand of both customer groups were found. Combined with the statement of Mr. Teigeler that the company expected in advance of the introduction of the premium about 20 % of the customers to potentially receive the premium - which is about the share of customers in the comparison group - it has to be assumed that most premiums were received rather accidentally than planned. In the current design the premium scheme is therefore rather a – costly – marketing instrument to advertise the tariff and increase customer loyalty than an effective instrument to stimulate energy conservation. But also for marketing issues it seems questionable in the current state as, based on the interviews, it seems to be widely unknown by customers. They chose the tariff mainly for its renewable electricity mix.

These results lead to the recommendation to increase the amount of the reward, on the one hand in order to raise awareness and enhance the visibility of the premium as some interviewees stated that they were perhaps informed but as the amount of the reward was not interesting they forgot about it. Additionally, a higher amount would increase the motivation to make an effort in order to receive the reward, as many interviewees were not motivated as the reward was perceived too little. However, a caveat is given by the fact that customers are widely unaware of the further offers and services of the company as presented in the evaluation of the interviews above, which

might be a general problem with regard to raising the awareness for the premium program regardless of the design of the premium program.

But, as research shows, the premium could have even worsened the performance of customers as behavioral economics research shows. Not only customers interviewed, but also Mrs. Spinnler perceive the premium to be too low to have a motivational effect. However, as found out in the interviews, interview partners are to varying degrees intrinsically motivated to save energy. In this case, a small monetary reward has no or even a negative effect on the motivation of previously intrinsically motivated customers as shown for a large variety of other cases. (Frey and Jegen, 2001; Kamenica, 2012; Mellström and Johannesson, 2008) This effect could be prevented either by increasing the premium or presenting and emphasizing with clear figures the cost reduction (on the bill) for an average household when saving 15 % electric energy¹⁴.

In the literature review above, goal setting and self-commitment was presented as one intervention option. In the case of the premium studied here, the reward was automatically paid to customers, who reached the 15 % goal. This means that no self-commitment is required, which probably lowers the motivation during the year not to lower the efforts but to stay dedicated. This could be solved by introducing the requirement of a simple application for the premium program, by which customers would have to consciously decide to commit to the task of a 15 % reduction. The positive side effect would be the reduction of windfall gains that are probably relatively high in the current design of the scheme, which would imply the option to increase the reward, because the amount of receiver would shrink.

The example of the premium scheme of STAWAG, another local utility company, shows that these modifications could lead to a more successful scheme. In the case of STAWAG customers have to apply to participate in a premium program for energy conservation. The applicants commit to reduce their demand by 10 %. If they reach this goal they are rewarded with 100 €, which was the case 727 times with 1,325 customers registered for the saving program. This would represent about 55% of all registered customers received the premium, however, some customers received the premium more the once. For all registered customers this resulted in a 5 % reduction of demand with the receivers lowering their demand by 20 % while the non-receivers increased their demand by 1.9 %¹⁵. However, this also shows the limited overall effect of such a premium scheme as the number of households is relatively small compared to the total number of households in the

¹⁴ A household with an demand of 3500 kWh/a saves about 147 € (28 ct/kWh)

¹⁵ Data was obtained by personal contact with an employee of the company via email

city of Aachen¹⁶. The same applies for the example of Frankfurt (briefly introduced above in Chapter 3), where the premium receivers are about 0.2 % of the total population. Only 8% of the citizens who know the premium – they represent 13.5 % of the total population – applied for the premium. Three major problems with the premium in Frankfurt were identified. First of all, the effort for the rather complex application (two previous bills have to be provided) is seen not adequately rewarded. Secondly, the goal is perceived to be high, which is why citizens fear high costs for investments. Thirdly, customers with middle to high educational degree assess the premium negatively as a financial incentive is used for an issue that they associate more with insight and a positive personal attitude and motivation. (Rubik and Kress, 2014)

The latter point is the reason for the recommendation to open the premium program to all customers, because it was shown that the average KlimaFix-customer is rather well off, has a high educational degree and is probably rather above average intrinsically interested in environmental issues and therefore motivated. Additionally, similar statements about financial incentives were made by interviewees in this study. To address the customers not interested in or even rejecting monetary incentives other premium options could be included as alternatives such as vouchers for energy efficient products, goods or a lottery or non-monetary rewards.

6.1.1 Assessment of the Saving Premium incorporating Sufficiency Theory

Considering the sufficiency literature briefly reviewed above the *Einsparbonus* is questionable due to a number of reasons. First of all, the *Einsparbonus* has to be assessed taking into account the current political environment. The monetary incentive as such is clearly in line with other market based approaches such as the emissions trading scheme of the European Union that prevail since the 1990s in environmental policy making (Dryzek, 2005). The offer of the premium shifts the responsibility to the individual to adopt other practices and reduce the demand or forego the premium. In contrast, structural changes such as a progressive tariff would affect all citizens in the same way. This development towards market based approaches in environmental governance is inseparably linked with the (free-)market ideology of neoliberalism with its emphasis on the responsibility of the individual to care for him/herself, world trade, growth and the responsibility of the individual (Dryzek, 2005; Duttweiler, 2007). This school of thinking is obviously contradictory to sufficiency theory with its emphasis on humility, the questioning of ever-growing material throughput of the economy, a push back of markets and respective approaches in certain

¹⁶ 140,000 in total, although it is not known how many households are customers of STAWAG
http://www.it.nrw.de/presse/pressemitteilungen/2009/pdf/192_09.pdf (accessed: 09.10.2014)

aspects of life and the unbraiding of global production chains towards a re-localization of the economy driven by needs and ecological requirements besides others (Princen, 2003; Sachs, 1993). In a critique (Spash, 2010) further accuses market based approaches to distract from the fundamental changes in behavior that are required.

Secondly, environmental psychology as presented above in the literature review suggests that monetary rewards for energy conservation are not an optimal measure for at least two reasons. The first reason is the fact that monetary premium is an extrinsic stimulation, which ceases when stimulation – the reward - is removed. Additionally, authors warn that financial incentives could quickly and easily stopped for the case of budget constraints. This leads to a higher probability that intervention fails and cannot initiate a lasting effect, because it requires time to change routines and daily practices and therefore a long-term interventions. The second reason is the shift in the motivation of individuals. With the external motivation of the monetary incentive the reason for reducing electricity demand is to receive the premium. But for a lasting effect, intrinsic motivation should be fostered, which could be also more cost-effective in the long-term.

Another problem of the premium scheme is the rebound effect. If applied effectively and on a large scale the savings combined with the reward would certainly contribute to rebound effects or even backfire on the macro-level. Although Mr. Unger doubted a large direct rebound effect by investments in household appliances, the financial resources freed-up by conservation measures are likely to be invested in other goods and services linked to energy or resource consumption.

Finally, the premium as such is in conflict with the postulation of decommercialisation in sufficiency literature, which implies a shift of norms away from profit making, the focus on money and the economization of life (Sachs, 1993).

6.1.2 Recommended Improvements of the premium

Although the premium is questionable as a policy instrument for sufficiency considering the literature it may be an instrument for awareness-raising and further interventions. To improve the program, the recommendations developed in the discussion above and based on the analysis of the customer interviews are here briefly summarized. These recommendations might increase the awareness for the *Einsparbonus* and foster customers motivation to consciously decide for a reduction of their demand.

The premium scheme could be improved by:

- An increase of the reward to 50 – 100 € to increase the motivation and visibility of the premium.
- An application to the premium program to minimize windfall gains, by customers reducing their consumption by chance.
- The Expansion of the premium scheme to all customers of the company, as KlimaFix-customers are on average intrinsically motivated and tend to assess monetary incentives rather negatively.
- A link of the premium scheme with the rental of ammeters, to allow customers to control the demand of appliances.
- An enhancement of the feedback when the premium is received by clearly addressing customers on the first page of the bill in the best case colorful, because most customers do not read the second page
- An enhancement the “visibility” of the premium by advertisement and a leaflet for customers with all premium options.
- The emphasis of the cost reduction of the yearly bill that is gained through a 15 % reduction of demand.
- The Provision of examples how an average household could achieve a 15 % reduction in demand.
- In order to address customers that are not interested in monetary incentives and to limit or inhibit rebound effects a substitution of the monetary premium with vouchers for efficient products or a lottery of non-monetary bonuses is suggested. The vouchers could be linked with the new shop in the internet and in the main street to draw attention to these services.
- In the best case incentivize people to read and send the electric meter once every three/six month, to additionally stimulate savings and support the efforts of customers.

These recommendations have the potential to improve the effectiveness of the scheme, although a caveat to be given is the difficulty of the company to reach their customers with additional offers. In the interviews it was revealed that, besides the electricity tariff, customers are widely unaware of the additional offers and services of the company such as the *Energieladen*. Therefore it would be helpful if the premium would be embedded within a broad citywide campaign with various elements as presented below, which would raise the general awareness for the issue of energy conservation.

6.2 Assessment of other Interventions

In the previous chapters a range of further interventions were presented and included in the interviews. For most of them, there is a broad empirical basis that prove the effectiveness of these interventions, although minima and maxima achieved might range considerably (Abrahamse et al., 2005; Darby, 2006; Rosenkranz et al., 2013). First to mention, more frequent feedback seems to be very important. It was one of the main issues that customers mentioned in the interviews

demanding varying kinds of feedback via Internet platform, enhanced advertisement for ammeters, more frequent invoices and visits by service personal in households to check energy consumption and give advice. The interviewees are already relatively good informed about options to save, but it is important for them to get feedback on their consumption to stimulate and sustain behavioral change. This was recently proved by a research project of Dena (dena, 2014) on the heating behavior of households. Households, who received a monthly inform about their consumption, saved about 9 % energy compared to their neighbors. While some interviewees were in favor of online feedback, the study of (Rosenkranz et al., 2013) find that online feedback is less effective due to a lack of engagement. The most effective feedback intervention, suggested by (Ehrhardt-Martinez and Laitner, 2010), is therefore the combination of real time feedback, with Smart Meters and in-home display, and offline tailored feedback that could be combined with injunctive statements to increase the motivation.

With the introduced informative bill in Germany, this kind of normative feedback can be already found on current electricity bills. A major problem with this informative bill, as shown in the interviews, is that many customers do not notice the benchmarks provided. While, some interviewees suggested measures to increase the visibility of this feedback, for example by a colorful cue on the first page of the bill, another measure could be a separate mail, such as a home energy report, with the normative feedback. The latter would be recommendable because more and more information is provided on the bill as pointed out in the interview by Mr. Teigeler and currently new legislative measures are introduced (Bundesrat der Bundesrepublik Deutschland, 2014). The advantage of interventions based on social norms is the lasting-effect that is created, in contrast to the short-term stimulus of monetary incentives. The example of OPOWER, presented above, revealed a high cost-effectiveness of this kind of intervention, although in this case the Home Energy Reports were sent out at least quarterly with the highest effect when sent out monthly (2.78 % reduction) (Allcott, 2011). While the comparative feedback used in the experiment (sample size 600,000 households) did include a smiley (red for above average, green for below), the interview with Mrs. Spinnler showed that this kind of “moralization” is problematic in the current political environment. The diagram as currently on the bill leaves it to the individual to assess and compare the own demand level with the averages of various household sizes.

While all these interventions are based on small non-monetary changes in the environment in which consumption decisions of the individual take place with the option for individuals to opt-out (i.e. ignoring the feedback), structural changes affect all consumers collectively. A report of the

House of Lords found these so-called nudges to be to certain degrees effective, but to be not sufficient when applied in isolation. The importance of further structural measures with regulatory approaches is emphasized to complement nudging approaches, while also regulatory measures are found to be less effective without being complemented (House of Lords - Science and Technology Select Committee, 2011). One of the main reasons for interviewees to argue for progressive tariff structures was particularly the characteristic of a regulatory measure to affect all citizens the same in contrast to the premium approach that can be voluntarily accepted or rejected (ignored). Additionally, the customers interviewed emphasized that such a pricing scheme would therefore have more significant effects compared to the premium for which customers can voluntarily decide. Nevertheless, as shown above scientists are skeptical about such a structural change because of the low elasticity of electricity prices. Recently, the price increase in Germany of 92 % between 2000 and 2014 (Statistisches Bundesamt, 2014) did not result in a significant reduction of the consumption level (statista, 2014). However, examples such as the introduction of progressive price structures in Cuba (Käkönen et al., 2014; Seifried, 2013), Italy and California (Dehmel, 2011) show that this measure could be a supportable tool for a successful sufficiency strategy when embedded within a larger campaign. Therefore it is argued below that the introduction of regulatory measures such as a linear or progressive price structures for electricity tariffs or tradable energy quotas (Starkey and Anderson, 2005) is recommended for its complementary function to the incentives presented above by disincentivizing exhaustive electricity consumption.

6.2.1 Assessment of the other Interventions incorporating Sufficiency Theory

The interventions and measures discussed above contribute to varying degrees for each measure but even for the specific design of the measure to an environment in which decisions on energy consumption are encouraged and enabled to be taken towards a reduction of energy consumption. With their enabling (i.e. feedback) and encouraging (i.e. normative feedback) characteristics these approaches are certainly important elements of a sufficiency strategy. A more detailed discussion of the instruments and their compatibility with sufficiency are beyond the scope of this master thesis and would require a more in depth study of each instrument.

While no discussion was found of the interventions with regard to sufficiency, (Dehmel, 2011) discusses the question of whether progressive price structures are a sufficiency instrument or not in his comparative study of progressive tariff structures in Italy and California the question. While (Dehmel, 2011) states the question whether such tariffs are sufficiency instruments is still open at

the same time an argument in favor of this question is presented as he states that “they set certain limits”. It poses the political and normative question of an upper limit of electricity consumption which was also discussed by Darby (2007) as a question of energy sufficiency. Nevertheless, the instrument still leaves the citizens the option to consume more when they are willing to pay more if trespassing a certain limit. (Dehmel, 2011) furthermore emphasizes the social aspect of this instrument as consumers with a low demand have to pay less than consumers with a higher one, which was the main argument that prevented the abolition in Italy after the liberalization of the electricity market in the EU. He states that “this social argument could be easily translated into an argument of environmentally appropriate and affordable electricity consumption, a question about normative thresholds”. Another argument in favor of progressive electricity tariffs is the option to limit effects of the rebound effect that is caused by a consumption reduction achieved with the instruments discussed here. Similar to the model of (Weizsäcker and Desha, 2010), along with average consumption decreases limits could be lowered and prices increased.

All these interventions tend to address the quantitative amount of electricity consumption, but do not or only indirectly address the values and norms within current societies and economy. They probably could lead to a modest energy demand but it is questionable if this will be successful within a society in which modesty is perceived to be anti-progress with most existing structures and thinking is directed towards expansion.

Therefore, a promising approach to complement these instruments in order foster sufficiency in societies in the long-term is seen by the author in the research on environmental attitudes as presented above in Chapter 3. It was excluded almost entirely in this thesis apart from the literature review because the research within this field is still not advanced to the point at which policy instruments based on the theory can be developed. Nevertheless, it is seen to be promising area as it is based on the research of attitudes of individuals that are intrinsically motivated and interested in environmental issues. Growing and fostering this intrinsic motivation by policy, surely partly by education, would certainly be the closest to the humanistic ideal of sufficiency theory of a consciously and voluntary adoption of sufficient lifestyles.

But, as pointed out above framework conditions still have a significant influence on individuals' behavior. Based on the insights gained in this study the sketch of a framework is presented in the following taking into account the multi-level architecture of governance in the EU.

6.3 Summary and Policy Proposals

Municipalities might be a promising starting point for sufficiency policy, because as pointed out above sufficiency and respective policies are in conflict with the fundamental principles of the current economic system such as the aim of economic growth and related power structures in societies. While it is assumed – based on the ontological framework presented above – that society can alter the principles the economy is based on, power structures in society might inhibit this change particularly on the national and supra-national level. Municipalities could be the governance level where these conflicts are less powerful and therefore might be more easily bypassed or at least overcome. A comparable phenomena are climate mitigation policies in the United States. Initiatives of states and the local level are introducing climate mitigation and renewable energy policies, while on the national level vested interests of lobby groups and institutional settings inhibit the introduction of effective legislation for these issues (Byrne et al., 2007; Engel, 2006). Additionally, the local level is important for energy conservation due to the ties to citizens and proximity of institutions as emphasized by Mr. Unger. Nevertheless, important framework conditions need to be altered at the national or supra-national level on the one hand to stimulate municipal activities and on the other by changing further structures that would contribute to the effectiveness of local interventions such as a decoupling of companies profit interests from selling more electricity (see interview evaluation with Mr. Teigeler).

Therefore, first a framework for a comprehensive energy sufficiency strategy is sketched (Figure 13) then, secondly, problems and limitations of this framework are discussed below. Particularly with the discussion of the limitations and problems of this proposal a more comprehensive analysis of the multi-level governance system of the EU and legislative measures in the energy market would be required. However, only some reference to further literature is given below as such an investigation goes beyond the scope of this thesis.

For successful interventions aiming at behavioral change generally a comprehensive strategy is required with bundles of policy options, including regulatory as well as soft measures of nudging (House of Lords - Science and Technology Select Committee, 2011). The same applies for a strategy that aims at lowering electricity demand (European Commission, 2012).

To start with the local level, which is also the topic of the thesis, there is a wide range of promising interventions reviewed in this thesis that could be introduced on the local level by municipalities or in cooperation with local utility companies. These are presented in the following using the framework developed by (DEFRA, 2005) for interventions aimed at behavioral change. While the

interventions in the categories of *Enable* and *Encourage* target the individual households with measures that support efforts to reduce electricity consumption, the additional measures of *Engage* and *Exemplify* create a supportive environment within the municipality and/or the neighborhoods that helps to make the topic present in the life of citizens.

Enable:

- Information about energy saving options provided by the municipality and local utility companies
- Energy audits
- Promotion of ammeter rental
- Online Portals and/or more frequent feedback on consumption

Encourage:

- Energy saving competitions
- Saving premiums
- Energy home reports with normative feedback

Engage:

- Community networks within an energy saving campaign that link neighbors to share their experiences with the co-benefit of increasing the social cohesion in the city
- Energy audits carried out by neighbors
- Providing the opportunity of citizens to give feedback in assemblies or written for a participatory process that could lead to improvements and new program elements

Exemplify:

- Exemplify the potential of saving measures with exemplary households or real world examples such as households that won a saving competition
- Publicly announced energy conservation measures within the administration of the municipalities
- Visible regulatory measures such as switching (every second) streetlight off or the obligation for shops to switch off lights after a certain time in the night

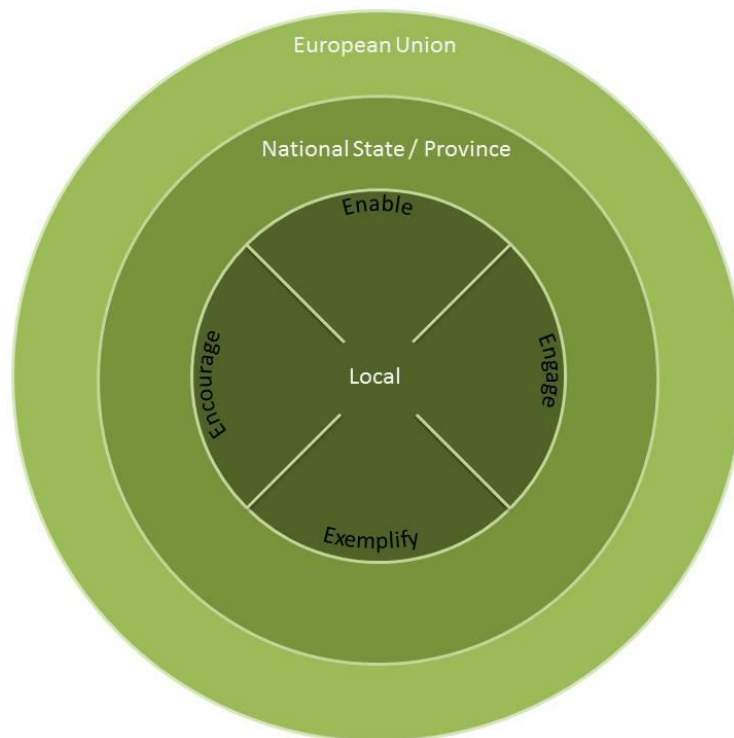


Figure 13 Policy Framework for an Energysufficiency Strategy

This preliminary collection of options could still be enlarged with additional approaches within each category, which is shown by the interventions within *Tübingen macht Blau* briefly described above that show that displays the still remaining potential for new ideas. To encourage municipalities to develop and test such new ideas, supportable framework conditions need to be established by the national or the provincial government. This could comprise energy or electricity saving competitions among municipalities or counties to overcome the requirement of an ambitious mayor (interview with Mrs. Spinnler), additional funding for such campaigns because in many cities the budget is very limited in contrast to Frankfurt (Mr. Unger). Additional legislative measures could comprise the modification of the tariff structure towards a progressive one, the obligation to send out home energy reports with normative feedback several times a year, and additional instruments such a white certificates and a negawatt-feed-in-tariff rewarding demand reduction (Pehnt et al., 2009). Such a comprehensive policy package on the national level would leave options for interventions on the local level while contributing particularly with the disincentive of a progressive pricing to a coherent environment that would support energysufficient practices.

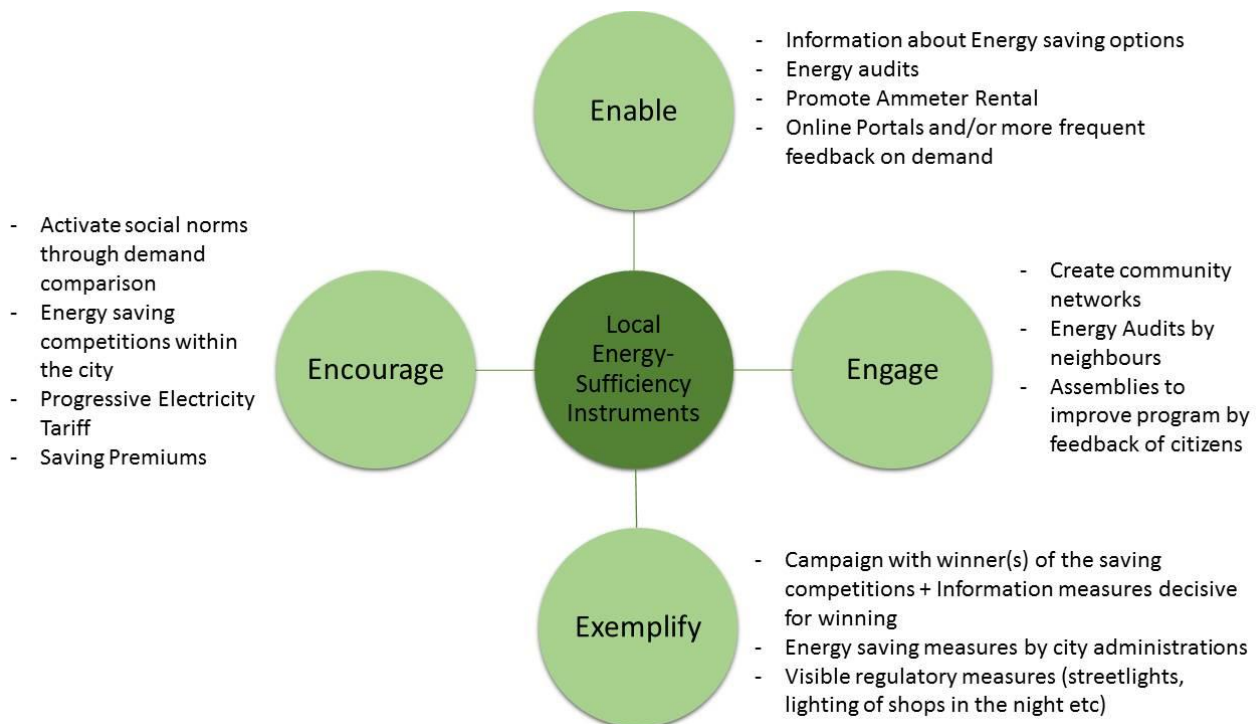


Figure 14 Instruments for an Energysufficiency Strategy on the Local Level

On the European level a requirement for supportable sufficiency measures would be a change of the discourse away from the focus on the technological term of “Energy Efficiency” and respective goals that neglect the findings of research about the rebound effect. Therefore, a turn back to “Energy Conservation” (Harris et al., 2008) or an analogous terminology would be required that comprises firstly the insight in absolute energy conservations goal and that, secondly, also takes into account the necessity of non-technological measures to reach this goal. This would not only strengthen the position of social science in this realm as advocated by (Allcott and Mullainathan, 2010) but would also entail the necessity for policy-makers to develop and implement non-technological policy measures. Such a shift would imply the introduction of proposals of such policy measures in respective directives that would lead national states to an implementation of measures that are outlined above. Additionally, further instruments need to be modified or introduced with which EU legislation directly effects all citizens. An example is the modification of the efficiency label by basing it on absolute (extensive) measures or with progressive requirements with increasing size of the appliance as already in place in the United States’ Energy Star label (Brischke et al., 2011; Pehn and Roming, 2013).

6.3.1 Problems and Limitations

In general as emphasized above, within the current political discourse in which the freedom of the individual is equalized with the freedom of consumption and therefore also the freedom to demand as much electric energy as the individual (unconsciously) thinks that he or she needs, inhibits or at least retards the necessary discussion on measures for energy sufficiency. Besides this general discourse problem two major barriers for an energy sufficiency strategy to be introduced are: firstly, the profit interest of energy supply companies coupled with the amount of electricity sold and secondly barriers on the local level.

With regard to the former, Mr. Unger doubted an active role of company in the realm of energy conservation, as within the current institutional setting these companies are necessarily in opposition to significant decreases of the consumption level. This opposition would cause resistance against any measures or instruments independently from being introduced at the European or local level. However, this takes the current framework conditions in which power suppliers are operating for granted, ignoring firstly the former existence of other framework conditions in Germany (Collier, 2013, p. 98 ff) and secondly other still existing structures for example in Italy (Dehmel, 2011). Particularly, (Collier, 2013, p. 98 ff) emphasizes the advantages of power supply companies working in the public interest with regard to energy efficiency. With the example of small municipal companies in Germany and Vattenfall in Sweden it is shown how the public interest in environmental conservation was translated into effective measures by a political agenda set by politicians before the liberalization of the European energy market in 1998. Secondly, (Dehmel, 2011) describes the option of progressive price structures to be introduced independently from the competitive elements of the electricity price by transmission and general system costs as well as by taxes. But even an introduction with these cost elements is currently difficult as for example also transmission infrastructure was privatized in Germany in 1998, although Mr. Teigeler indicated some current trends in thinking about modifications with regard to this issue in the interview caused by decreasing transmission payments with the increasing use of photovoltaic systems. Furthermore, he stated a principal openness for a change in the pricing structure emphasizing that the *Einsparbonus* is a step forward towards such a change. For a detailed discussion of the potential problems for the introduction of progressive tariffs, (Tews, 2011) is recommended.

While there is a great variety of options for municipalities beneficial for an active role within a sufficiency strategy besides the fact that it could be assumed that conflicting interests and power

structures are not as strong as on higher levels, there are various difficulties for a sufficiency strategy on the municipal level. Firstly, there are budget constraints and many municipalities have to handle issues with a higher priority than energy conservation (Interview with Mr. Unger). Secondly, in municipalities where ambitious programs are already in place these were introduced by strong personalities, who devoted their energy towards this issue. Thirdly, most interventions on the municipal level are rather nudges which are less effective if not complemented with regulatory measures. Finally, many municipalities completely privatized formerly municipal power suppliers, which would be an important cooperation partner and even for cities like Heidelberg the influence on the company's activities seems to be limited within the current setting. This again shows the interconnectedness and complexity within this realm, as for most issues the municipality requires the upper levels support for a sufficiency strategy.

7 Conclusion

In the study on hand it was shown firstly, that there is still a large potential a reduction of energy demand by energy sufficient practices stimulated by various instruments. The examples of Setsuden in Japan and similar phenomena in Brazil and Juneau in Alaska (with 20 % and 25 % reduction) (Charles, 2009; Leighty and Meier, 2010) show the potential magnitude of demand reduction by behavioral changes when political will is present. However, on the other hand these are all examples of a demand reduction that was enforced by scarcity and under the impression of immediate external circumstances caused by catastrophes (Setsuden), technical failures (Juneau) or shortages due to weather phenomena (Brazil). It remains questionable whether societies are able to accept the rather opaque and long-term phenomena of climate change as such a circumstance that the fundamental changes required for mitigation are accepted and realized. From the standpoint of climate sciences pressure is present particularly for industrial countries today, but in general it is not perceived in this way as climate change is more amorphous, distant and therefore less present which makes it seem to be less urgent. Secondly, a wide range of intervention options was reviewed in the master thesis, with a detailed investigation in the case study of the *Einsparbonus* including expert knowledge and taking into account the institutional setting. While a larger study would be required for a specification and detailed investigation of various elements that were outlined in the analysis and respective conclusions, some important points were found.

Firstly, with respect to the *Einsparbonus*, the results of the evaluation show that in the current design the premium scheme does neither contribute to increased efforts for electricity conservation nor is it helpful in a marketing view to increase customer loyalty. The reason for that is, that probably most customers choose the tariff because of the renewable energy mix, which is why additional elements of the tariff receive less awareness. Secondly, the small reward and the fact that additional savings are not emphasized leads the customers, which are in their majority rather well-off, to either not notice the offer or not being stimulated by it. Thirdly, as many customers already engage in energy conservation practices the goal of 15 % conservation is perceived to be too high, because necessary savings are not exemplified. Therefore, a number of recommendations to improve the scheme were developed including ideas from the customer interviews. For a sufficiency strategy the premium approach, apart from the associated high costs,

is questionable for its pecuniary nature and the indirect rebound effect to which it would contribute besides the financial savings due to a lowered bill.

In the following discussion of a framework for an energysufficiency strategy some arguments were found for a central role of municipalities and counties in such a venture. Firstly, a large variety of intervention options were found that could be introduced on the local level comprising all four areas in the framework of defra. Secondly, with the introduction and testing of sufficiency policies on municipal level new experiences can be gained, as on the local level major barriers that inhibit change on upper levels could be bypassed or are at least easier to be overcome. However, with the instruments presented sufficiency would become more institutionalized than “grass-roots” movement (such as transition town groups) and would therefore entail a higher potential for diffusion and adoption of sufficient practices. Thirdly, it has to be remarked that to exhaust the complete potential additional framework measures on the national and supra-national level of the EU are required to support and complement local initiatives.

Finally, some remaining issues such as ethical considerations, limitations of the project and questions for further research shall be discussed.

Ethical considerations

In general, a difficult topic is to use incentives to influence the behavior of or nudge individuals in a direction preferred by policy makers. A humanistic approach in contrast should aim to develop critical thinking and enable people to decide deliberately about consumption patterns upon the insight to save energy. Particularly in the field of sufficiency this is problematic as some definitions particularly emphasize the voluntary and conscious decision-making and adoption of sufficient lifestyles by individuals. Nevertheless, on the other hand, and this stance is taken for this research project, policies of this kind could also be viewed as enabling and facilitating policies. These policies are aimed at giving individuals the opportunity to adopt sufficient behavior more easily than within the current legislative and societal framework.

Limitations and Recommendations for further research

An evaluation and comparative study of the different premium programs that are already in place would be required to further improve the programs and make them applicable for other institutions. Further research will be necessary in order to investigate the possible rebound effect due to financial rewards for savings that might be used for more energy intensive products or services outside the particular household. As it is rather likely that a rebound effect is caused by

the financial premium, modifications of the tariff and/or additional changes in the framework conditions will be required in order to achieve reductions on the macro-level.

Requirements and the effect of further structural changes and interventions that are not based on nudging but more regulatory for an energy sufficiency strategy need to be investigated. Finally, but importantly, changes in framework conditions for energy suppliers that would enable them to be more eager in creating conditions for energy sufficiency need to be developed and examined.

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Appendix A – Consumer Groups

Categories of household size adopted from study of NRW Energie.Agentur¹⁷. In table x the change in the mean consumption level is calculated comparing the first to the third year, to compare values with a more or less equal sample size. In table x the years 2011 is compared to 2013 for the same reason.

	years of contract	KlimaFix		Default Supplier	
		Consumption [kWh/a]	No. of household	Consumption [kWh/a]	No. of household
up to 1500 kWh/a (frugal households)	1	977.65	2970	977.06	3752
	2	1024.32	1982	1089.768	3139
	3	1041.95	993	1092.943	2183
	4	124.53	333	1083.52	120
	change [%]	6.58		11.86	
1500 - 2800 kWh/a (1-person)	1	2085.43	2807	2059.32	3084
	2	2073.54	1948	2044.56	2766
	3	2065.27	1022	2013.1	2115
	4	2014.59	323	1915.88	117
	change [%]	-0.97		-2.24	
2800 - 3500 kWh/a (2-persons)	1	3132.378	1027	3126.77	861
	2	3029.961	693	3064.07	792
	3	3021.097	373	3009.7	638
	4	2934.364	118	2902.92	26
	change [%]	-6.32		-7.16	
3500 - 4500 kWh/a (3-persons)	1	3961.69	914	3943.46	741
	2	3833.57	644	3829.05	694
	3	3838.71	319	3738.49	558
	4	3749.8	97	3410.42	38
	change [%]	-0.03		-0.05	
4500 - 5500 kWh/a (4-persons)	1	4963.68	469	4969.66	331
	2	4758.6	338	4714.59	314
	3	5688.73	179	4556.46	265
	4	4709.81	67	4519.68	19
	change [%]	14.61		-8.31	
5500 – 6500 kWh/a (5-persons)	1	5972.22	273	5952.05	153
	2	5790.396	182	5551.1	147
	3	5652.13	93	5529.19	120
	4	5224.86	36	4738.43	7
	change [%]	-5.36		-7.10	
more than 6500 kWh/a (6 or more persons)	1	8380.98	384	8056.642	187
	2	7822.909	253	7412.63	170
	3	7391.585	118	7046.82	131
	4	6946.55	44	7525.82	11
	change [%]	-11.81		-12.53	

¹⁷ „Wo bleibt der Strom im Haushalt“

http://www.energieagentur.nrw.de/_database/_data/datainfopool/erhebung_wo_bleibt_der_strom.pdf

		KlimaFix		Default Supplier	
	year	Consumption [kWh/a]	No. of households	Consumption [kWh/a]	No. of households
up to 1500 kWh/a (frugal households)	2010	979.18	141	739.29	7
	2011	987.89	1307	989.51	2882
	2012	999.04	1819	1040.42	2884
	2013	1016.46	2133	1086.96	3010
	2014	1019.49	874	1154.56	401
		2.89		9.85	
1500 - 2800 kWh/a (1-person)	2010	2084.12	154	2235.75	4
	2011	2092.69	1260	2070.29	2500
	2012	2074.48	1810	2066.67	2581
	2013	2078.73	2120	2002.3	2673
	2014	2029.87	748	1903.04	319
		-0.67		-3.28	
2800 - 3500 kWh/a (2-persons)	2010	3191.59	61	2972	1
	2011	3129.83	468	3126.97	728
	2012	3066.32	656	3118.301	757
	2013	3052.55	775	2978.87	760
	2014	3000.15	250	2964.64	70
		-2.47		-4.74	
3500 - 4500 kWh/a (3-persons)	2010	3986.15	67	3890	1
	2011	3941.55	415	3954.03	648
	2012	3898.26	600	3919.5	647
	2013	3867.31	684	3683.81	668
	2014	3802.76	207	3457.4	65
		-1.88		-6.83	
4500 - 5500 kWh/a (4-persons)	2010	5058.68	34	4972	2
	2011	4924.47	212	4981.32	296
	2012	4792.58	309	4867.91	295
	2013	4807.27	355	4465.32	304
	2014	4809.624	141	4364.03	30
		-2.38		-10.36	
5500 – 6500 kWh/a (5-persons)	2010	6026.29	17	0	0
	2011	5956.14	130	5942.81	139
	2012	5855.22	172	5784.44	134
	2013	5764.153	202	5412.79	141
	2014	5546	62	4536.77	13
		-3.22		-8.92	
more than 6500 kWh/a (6 or more persons)	2010	8507.22	18	0	0
	2011	8120.806	165	8020.44	154
	2012	7995.66	235	7616.62	164
	2013	7914.268	269	7217.62	158
	2014	7806.86	112	6362.73	22
		-2.54		-10.01	

Evaluation of Premium according to consumer groups, with the percentage given for the total number of consumers in the respective group.

	KlimaFix		Default Supplier	
	Premium paid [times] and [% of customers]	Premium received [No. Customers] and [% of customers]	Premium paid [times] and [% of customers]	Premium received [No. Customers] and [% of customers]
Up to 1500 kWh/a (frugal households)	431 14,51	401 13,50	726 19,35	694 18,50
1500 - 2800 kWh/a (1- person)	399 14,21	359 12,79	806 26,13	756 24,51
2800 - 3500 kWh/a (2- persons)	148 14,41	136 13,24	220 25,55	203 23,58
3500 - 4500 kWh/a (3- persons)	142 15,54	132 14,44	203 27,40	187 25,24
4500 - 5500 kWh/a (4- persons)	65 13,86	60 12,79	121 36,56	112 33,84
5500 - 6500kWh/a (5- persons)	42 15,38	38 13,92	48 31,37	45 29,41
more than 6500 kWh/a (6 or more persons)	70 18,23	66 17,19	74 39,57	63 33,69

Appendix B – Districts of Heidelberg

District	KlimaFix- Customers	Default supplier- Customers
0	1582	365
Altstadt	601	453
Bergheim	416	444
Boxberg	161	874
Emmertsgrund	191	1028
Handschuhsheim	979	92
Kirchheim	725	2482
Neuenheim	772	77
Pfaffengrund	388	1236
Rohrbach	723	654
Schlierbach	147	410
Südstadt	264	30
Weststadt	753	162
Wieblingen	456	798
Ziegelhausen	494	0

Appendix C – Characteristics of interviewed households

	1	2	3	4	5	6	7	8	9	10	11	12
Household size	2	1	1	1	2	2	1	3 (one child)	2	2 (5)	2	2, two children
Gender of Interviewee	Woman	Woman	Woman	Woman	Woman	Man	Man	Woman	Man	Man	Man	Man
Age	32	56	79	63	62	63	55	40	66	68	79	44
Living space (m ²)	60	43	95	70	140	110	45	80	100	120	156	150
Income per household [€/month]	3000 -4000	1000 -2000	Ca. 4000	Ca. 1000	4000 - 5000	4000 – 5000	Below 1000	Above 5000	4000 - 5000	N.A.	4000 - 5000	N.A.
Highest completed education	University	Secondary	University	Secondary	University	University	University	University	University	University	University	University
Electricity consumption [kWh]	Ca. 1200	Ca. 1100	Ca. 2100	Ca. 1100	Didn't know	Ca. 1700	Ca. 500	Didn't know	Below 1500	ca. 10,000	Ca. 3000	ca. 2700
Premium known	No	No	No	No	No	No	Yes	No	No	No	No	Yes
Premium received	No	In 2012	No	In 2012*	No	In 2012*	In 2013 and 2014*	No	No	No	No	No
Change in household size	No	No	No	No	No	Yes, 2 children left	No	No	Yes, two children left		No	No
Housing type	Rented Apartment	Rented Apartment	Rented Apartment	Rented Apartment	Rented Apartment	Single Family House	Rented Apartment	Rented Apartment	Owned Apartment	Owned House with apartments	Owned Apartment	Owned Apartment
Member of an environmental NGO	No	No	Yes	No	Yes	Yes	Yes	No	No	No	No	No

* The interviewer was informed about the payment of the premium by the company after the interviews were done.

Appendix D – Interview Guideline for the Customer Interview

For the interviews a guideline was developed comprising questions on five larger subjects. Firstly, questions on general characteristics were included to get people speak about electricity consumption in their households, get an impression of the general awareness for environmental issues and energy conservation in particular of the household and about the decision process and arguments for choosing the KlimaFix-tariff. In the second part, the interviewees were informed about the premium scheme, even the two interviewees stating they knew about the scheme had to be told about the exact way it is designed. They were asked about their perception of the premium scheme, their motivation due to the premium and the effect the premium could have over-all. Mostly when talking about these issues interviewees voiced some ideas for a modification of the scheme, but where asked again at the end of the section. The questions of the third and the fourth part were mixed in most interviews, as interviewees talked about or directed the issue in their statements towards municipal politics in the second part which is why questions then were brought in about further intervention options with the link to national politics about the informative bill. Finally, questions about the perception of further services and offers of the local utility company were included on the one hand as the researcher was asked by the company to incorporate these in the interviews, on the other hand the questions were also interesting with regard to the awareness for the premium as most interviewees were not well informed about these additional offers of the company which might be also a reason for interviewees low awareness for the premium.

Interview Guideline

Interviewee-Nr.: _____

1. General characteristics of the households with regard to energy consumption and awareness for the issue:
 - Open questions to start the interview, such as: In how far are you aware of your electricity consumption?
 - Who cares for the electricity demand in your household?
 - Is there a division of housework in your household? Which task is done by whom?
 - Who decides when purchasing new appliances? Are there appliance-specific differences?
 - How were you informed about the KlimaFix-tariff?
 - Why did you choose to take KlimaFix?
 - Who decided to take the tariff?
 - For how long do you have it?
 - What do you especially appreciate with regard to the tariff?
 - Which changes come to your mind with regard to options for energy conservation in households?
 - ☐ Do you carry out some of these? Which not and why?
 - ☐ Did change your consumption behavior and/or did you purchase efficient devices in the last years since taking the tariff? (timeline)
 - Are there specific changes that you can imagine that would help you to care for your energy consumption?
 - Where do you inform yourself before deciding for a new appliance?
 - Where do you buy your new appliances?
2. The Einsparbonus:
 - Do you know the Einsparbonus within your tariff?
 - Did you know it in advance of taking the tariff?
 - ☐ If yes: Was it a reason for choosing?
 - ☐ If not: How were you informed after choosing the tariff?
 - What effect did the information about the bonus have on you with regard to your electricity demand?

- Questions for interviewees that received the premium:
 - ☐ Did you actively and intentionally try to receive the premium?
 - ☐ Which changes did you apply in order to receive the premium?
 - ☐ Did you use one of the additional offers of the company for the reduction (i.e. exchange of heat pump)?
 - ☐ Did you make a draft on consultancy offers (i.e. in the internet, KliBA)?
 - ☐ What was the main incentive to carry out the consumption reduction?
 - ☐ Do you know whether you stayed on the level after receiving the premium?
 - ☐ Do you still try to reduce your consumption?
 - ☐ Would try to receive the premium again?
 - ☐ Do you aim at receiving the premium a second time?
 - ☐ If achieved by efficiency measures: Would you try to receive the premium applying non-efficiency changes such as behavioral changes or smaller appliances?
 - If premium was not received:
 - ☐ What do you think about the premium? (Is there a reason why it was not received?)
 - ☐ Would you have tried to receive the premium if you were informed about it?
 - ☐ Do you aim to receive the premium in the future?
 1. If yes: Do you already know how you will try to achieve the reduction goal?
 2. If not: Why not?
 - ☐ With which modifications in the premium design would it have a bigger impact on you?
 - Which modifications in the premium design would improve its attractiveness and increase your and the efforts of other customers?
3. Political Environment
- The premium was introduced by the local utility company although the company is privatized (owned by the city). Can you imagine the reasons for the introduction of such a premium scheme?
 - What do you think in general about the link between the municipality and the company?
 - What do you think about national politics with regard to the issue of energy consumption?
4. Further interventions
- What additional measures could you think of that would stimulate you to save more electricity?
 - Would you consider making a draft for an energy audit? Where would you do it?
 - Do you know the information provided on the new informative bill?
 - ☐ What do you think about it?
 - Would you care more for your electricity consumption if it would be more visible?
 - ☐ if you would receive more frequent feedback?
 - What do you think about a progressive price model for electricity?
5. Questions on further services by the company
- Do you know the Energieladen of the utility company?
 - ☐ Did you visit it?
 - ☐ What do you think about this service of the company?
 - Do you know the Effizienzshop on the web page of the utility company?
 - ☐ Are you in principle interested in the offer?
 - ☐ What do you think about the shop?
 - ☐ How do you like the shop?
 - Do you know the additional offers of the company that are offered such as the option for an exchange of the heating pump that is paid with the electricity bill in the following years or the voucher for a pedelec when getting a new KlimaFix contract?
 - Do you know the product Heidelberg GREEN?

- ☐ Would you be interested in getting the product?
- Do you know the projects that are funded with the Klimabonus of the company?
- What do you think about the engagement of the company with respect to environmental issues?

Questionnaire

Interviewee: _____

- How many persons live in your household?
 - ☐ 1
 - ☐ 2
 - ☐ 3
 - ☐ 4
 - ☐ 5
 - ☐ 6 or more
 - ☐ Including _____ children (younger than 18)
 - ☐ Including _____ elderly (to be cared of)
- Did the number of persons living in your household change since having the KlimaFix-tariff?
 - ☐ Yes, _____ persons moved out
 - ☐ Yes, _____ persons moved in
 - ☐ No
- How much is the monthly income of the household?
 - ☐ Below 1,000 €
 - ☐ 1,000 – 2,000 €
 - ☐ 2,000 – 3,000 €
 - ☐ 3,000 – 4,000 €
 - ☐ 4,000 – 5,000 €
 - ☐ Above 5,000 €
 - ☐ Prefer not to say
- What is your highest educational qualification?
 - ☐ Completion of compulsory basic secondary schooling
 - ☐ General certificate of secondary education
 - ☐ Entrance requirement for higher education
 - ☐ University degree
 - ☐ Prefer not to say
- Did you receive the Einsparbonus in the last years?
 - ☐ Yes
 - ☐ No
 - ☐ Don't know
- How much electricity did your household consume in the last year?
 - ☐ Below 1,500 kWh
 - ☐ 1,500 – 2,800 kWh
 - ☐ 2,800 – 3,500 kWh
 - ☐ 3,500 – 4,500 kWh
 - ☐ 4,500 – 5,500 kWh
 - ☐ 5,500 – 6,500 kWh
 - ☐ More than 6,500 kWh
 - ☐ Don't know
- How do you live?
 - ☐ Single-Family house
 - ☐ Owned apartment

- ☐ Rented apartment
- What's the size of your living space: _____ m²
 - How old are you? _____

Appendix E – Categorization of Interviews

Interview	Paraphrase	Generalization	Main category	Subcategory 1	Subcategory 2
1	No attention paid because of missing measure to control	No attention to energy saving.	1	a	
	Feedback is required to control the consumption	Need for feedback	3	b	i
	Husband knows more, but also not more attentive	Husband more responsible, but also not very attentive	1	a	i
	Wife does the housework. Husband helps.	Major part of the housework done by the wife.	1	b	i
	Husband decides on new devices, the wife cares for energy efficiency of the devices.	Joint decision for appliances	1	b	ii
	information in the internet is compared with offers in stores	Information in the internet	1	b	iii
	Energy audit is useful but should be more advertised.	Energy audit is useful but not visible enough.	3	c	
	Standby problematic is known. Eco-programs in dishwasher and washing machine are used, dryer seldom used. Lights are switched off.	Good knowledge about energy saving options, but does not yet translate all options into action.	1	c	
	Aware of further saving potentials by carrying out known options more often.	Awareness that options are still not fully exploited.	1	c	
	Some energy efficient appliances exist (washing machine with A label and energy-saving bulbs) but still working appliances are not exchanged.	Energy efficiency is a high priority when buying appliances.	1	c	ii
	Information about KlimaFix was provided by a leaflet.	Information about KlimaFix by leaflet.	2	b	i
	The tariff was chosen because it is of the local company.	Proximity and loyalty to the company was a criteria for choosing	2	b	ii
	The tariff was chosen because of renewable energy.	Renewable energy was a criterion for choosing the tariff.	2	b	ii

The decisive reason was that the electricity is from renewable sources, even though it's more expensive	Renewable energy was a criteria for choosing the tariff	2	b	ii
The wife decided to take the contract because it was important for her.	It was the wife's decision to take the tariff.	2	b	iii
They are customers for three years.	Customers of KlimaFix for 3 years	2	b	iv
Comfortability and renewable energy were important when deciding for the tariff.	Renewable energy was a criteria for choosing the tariff	2	b	ii
	Comfortability was a criterion for choosing.	2	b	ii
Einsparbonus was not known	The Einsparbonus was unknown.	3	a	i
The idea is good. But how should the consumer measure the demand.	Einsparbonus welcomed and motivation acknowledged.	3	a	iii
	Feedback on demand would be needed.	3	a	iii
Means to measure consumption are required.	Need for feedback	3	b	i
No information was obtained about the Einsparbonus.	Increase visibility	3	a	iv
Einsparbonus was not known, but the idea is good.	The Einsparbonus was unknown	3	a	i
The idea of the bonus is good.	Einsparbonus welcomed and motivation acknowledged.	3	a	iii
After moving to a new apartment the living standard rose, now it could be possible to save more.	In principle motivated	3	a	ii
The Einsparbonus motivates but, does not apply to her situation.	Einsparbonus welcomed and motivation acknowledged.	3	a	iii
The program should be coupled with a device for measuring the energy consumption or service personal visiting the customers every half a year, to inform them about their consumption and options for reduction.	Program should be coupled with smart meters and/or energy audits	3	a	iv

The program should be coupled with a device for measuring the energy consumption or service personal visiting the customers every half a year, to inform them about their consumption and options for reduction.	Need for feedback through Energy Audits	3	c	
Smart Meter proposed in order to control consumption.	Smart Meter in home display would be welcomed	3	b	ii
Voucher is preferred over a credit on the bill.	Voucher as an alternative to credit on the bill.	3	a	iv
A monthly bill could be an option, but should be sent via email.	More frequent feedback is appreciated.	3	b	iii
An online portal could help to inform oneself.	Online platform would be welcomed	3	b	iv
The information on the bill is not known but welcomed.	Information on the bill is not known.	3	b	v
	Information is welcomed.	3	b	v
Energy audits are a good option but should be more advertised.	Energy audits of the municipality should be more advertised.	3	c	
A progressive tariff model is welcomed but questions on justice are raised.	Doubts in regard to justice issues related to the progressive model	3	d	
	In principle appreciates a progressive tariff model but has concerns for the one penalized erroneously.	3	d	
Politicians should play a more active role if they are in favor of energy conservation. Links between company and municipality are seen.	Politicians in favor of energy conservation should play an important role	4	a	
Energieladen is not known, perhaps seen, but could be useful.	Energieladen is unknown.	2	c	i
Effizienzshop is not known but interested in it.	Effizienzshop unknown, but interest in it.	2	c	ii
Pedicels have a negative image and many people live in rented flats. Additional offers for other target groups should be provided.	Offers not known. Supports additional offers. But not in the target group.	2	c	iii
Heidelberg Green is associated with high additional costs. Donations to NGOs preferred.	Heidelberg GREEN is not known and no interest in it.	2	c	iv

	The Klimabonus is not known but welcomed. Leaflets of the company are well made but not read.	Klimabonus is appreciated but not known	2	c	v
2	Self-observed high awareness for energy consumption.	High attentiveness to energy demand	1	a	
	Saving money and contributing to resource conservation as reasons for energy saving.	Motivation is to save money and contribute to resource conservation.	1	a	i
	Information about new appliances in the store.	Information at the point of sale.	1	b	iii
	Information about labels in the internet.	Information in the internet	1	b	iii
	Oversized appliances are rejected.	No purchase of appliances that are oversized.	1	c	i
	Cares for energy conservation by informing herself and using energy efficient products	Energy efficiency is a high priority when buying appliances.	1	c	ii
	Energy is saved by switching of standby-devices, new energy efficient appliances and using the dryer only when necessary.	Good knowledge and application of measures for energy conservation	1	c	
	KlimaFix was offered by the company after the old contract ended.	Tariff was offered by the company (customer before)	2	b	i
	The service of the company is good.	Service of the company is appreciated.	2	a	
	Loyalty to the company as a reason for choosing the contract of it.	Proximity and loyalty to the company was a criteria for choosing	2	b	ii
	The ecological part of the contract was decisive.	Renewable energy was a criteria for choosing the tariff	2	b	ii
	The renewable energy was the reason for choosing.	Renewable energy was a criteria for choosing the tariff	2	b	ii
	Minimization of energy consumption independently from an incentive.	No motivation: already saving and no further potential	3	a	ii
	Shows intrinsic motivation to save.	Intrinsic motivation for energy saving.	1	a	
	Einsparbonus was no reason for choosing, because it was not known and not potential for further savings.	The Einsparbonus was unknown	3	a	i
		The Einsparbonus would have been no reason to take the tariff because already trying to minimize consumption.	3	a	i

3-4 years customer of KlimaFix	Customer of KlimaFix for 3 to 4 years.	2	b	iv
	Service of the company is appreciated.	2	a	
Appreciation of price stability, comfortability and good service	Price stability was a criterion for choosing.	2	b	ii
Einsparbonus was not known.	The Einsparbonus was unknown	3	a	i
No information about the Einsparbonus received before the interview.	Einsparbonus was not known	3	a	i
Einsparbonus could be a potential incentive but no potentials for further savings.	No motivation: already saving and no further potential	3	a	ii
Pessimism about people's motivation to save, because it is associated with restraint.	Premium, even with another design, would not incentivize people.	3	a	iii
Einsparbonus has to be increased significantly.	Increase of the premium.	3	a	iv
Pessimism about further potential to save because of too less consciousness and too many devices.	Premium, even with another design, would not incentivize people	3	a	iii
Online portal as an easy option to inform oneself and for the younger generation.	Online platform would be welcomed	3	b	iv
Bills could be sent out twice a year. Comparison with the average could be very effective.	Bills twice a year could increase the consciousness	3	b	iii
	Information on the bill could be very effective.	3	b	v
The information on the bill was read just before the interview. To increase the awareness it should be made more visible. If seen by citizens it could stimulate consciousness about energy conservation.	Information on the bill is not known.	3	b	v
	Information should be more visible and easier to understand	3	b	v
No particular interest in a progressive tariff model.	Indifferent about progressive tariff.	3	d	
The topic of energy conservation should be more present in daily political debates and in the media. Thereby the consciousness could be raised.	Politicians and media should speak more about the topic to make people aware	4	b	
Politics and media should address more the topic of energy saving to make people aware of it.	Politicians and media should speak more about the topic to make people aware	4	b	

	Energieladen is not known.	Energieladen is unknown	2	c	i
	Effizienzshop is not known but interested in it.	Effizienzshop unknown, but interest in it.	2	c	ii
	Not addressed by this kind of offers. For others it could be interesting	The offer is ok, but no interest in it.	2	c	iii
	There are too many photovoltaic plants.	Heidelberg GREEN is not known and no interest in it.	2	c	iv
	The environmental engagement of the company is appreciated.	The environmental engagement of the company is appreciated.	2	c	vi
	The Klimabonus is a good initiative of the company.	Klimabonus is appreciated but not known	2	c	v
3	Energy saving is associated with restraint. But electricity is not wasted.	Relatively attentive to energy consumption. Tries not to waste electric energy	1	a	
	The own electricity demand is assessed to be average.	Own demand is average.	1	a	
	All housework is done by the interviewee.	All done alone.	1	b	i
	New efficient appliances are only bought when old ones are broken.	New appliances are energy efficient but still old ones.	1	c	i
	The company informed the customer about KlimaFix when the old tariff ended.	Tariff was offered by the company (customer before)	2	b	i
	The tariff was chosen because of ecological reasons.	Renewable energy was a criterion for choosing the tariff.	2	b	ii
	Customer of KlimaFix for 4 years.	Customer of KlimaFix for 4 years.	2	b	iv
	The tariff is associated with less environmental impact.	A criterion is that it's not harming the environment.	2	b	ii
	The Einsparbonus was not known. It was even more energy consumed.	The Einsparbonus was unknown	3	a	i
	The Einsparbonus is no incentive to change anything.	No motivation: Reward is too low	3	a	ii
	The Einsparbonus does not stimulate investments in new appliances.	Premium too low to stimulate investments in energy efficiency.	3	a	ii
	The Einsparbonus is too low.	Increase of the premium.	3	a	iv

Some options to save energy are known (standby devices) but it is not stated whether it is done anything and with regard to bigger investments and changes there is no sign to change anything.	Good knowledge about energy saving options, but does not yet translate all options into action.	1	c	
The Einsparbonus could stimulate people to think about their energy consumption but it's too low to change anything.	Einsparbonus stimulates reflection about energy consumption but does not motivate.	3	a	ii
The Einsparbonus should be higher or could be a voucher with a high value.	Voucher as an alternative to credit on the bill.	3	a	iv
	Increase of the premium.	3	a	iv
Link between municipal politics and the company is known but it is not known whether the company is influenced politically. The mayor should exert influence.	Municipal politics should influence the company. Advantage that it is controlled by municipality.	4	a	
No interest in energy consulting because it is known that more could be done. Costs for an energy consulting are rejected.	Costs for consulting are rejected.	3	c	
It is known that more energy could be saved.	Good knowledge about energy saving options, but does not yet translate all options into action.	1	c	
Information on the bill was not noticed.	Information on the bill is not known.	3	b	v
The bill could be still just once a year but a better overview should be provided.	Need for a better overview over consumption by months.	3	b	i
A second information could be provided after half a year.	Bills twice a year could increase the consciousness	3	b	iii
Politics should address industry not households. It is perceived that industry and infrastructure wastes more energy than private households.	Politics should address industry and "big" consumers (streetlights, traffic lights) not private households.	4	b	
Progressive electricity tariff could be effective to make people save more energy, but	Doubts in regard to justice issues related to the progressive model	3	d	

	questions of justice are raised.	Progressive tariff is supported and would be effective.	3	d	
	Information was obtained in MediaMarkt but the machine was bought elsewhere.	Information at the point of sale.	1	b	iii
	Energieladen is known, but was not visited yet.	Energieladen is known. But was not visited.	2	c	i
	Effizienzshop is not known.	Effizienzshop is unknown.	2	c	ii
	Offers are appreciated but do not address her needs.	Offers not known. Supports additional offers. But not in the target group.	2	c	iii
	It is known that the company is installing photovoltaic systems. But Heidelberg GREEN is not known.	Heidelberg GREEN is not known and no interest in it.	2	c	iv
	The Klimabonus is welcomed.	Klimabonus is appreciated but not known	2	c	v
	The interviewee is a member of BUND and Greenpeace.	Member of an environmental NGO	1	a	ii
	The engagement of the company for the environment is positive.	The environmental engagement of the company is appreciated.	2	c	vi
	The two main criteria for choosing the tariff were renewable energy and the price.	Renewable energy was a criterion for choosing.	2	b	ii
4		The price as criteria for choosing the tariff.	2	b	ii
	Experienced shortages in the youth, with light being something special	Frugality because of past experiences and a resulting appreciation of electric energy.	1	a	i
	Lives on her own after the death of her mother and her daughter moving out. Because of a big flat and a small rent the budget is limited.				
	Economic reasons for saving electricity.	Economic reasons for saving electricity.	1	a	i
	At the moment no division of housework, because there are no other household members anymore.	Housework shared.	1	b	i
	Decision on new appliances was done by herself, with the limited budget as a constraining factor.	Decision about appliances alone.	1	b	ii

Energy efficient appliances are also associated with economic efficiency and are therefore preferred.	Economic reasons for energy efficient appliances.	1	c	ii
It is a problem that there are no windows in the bathroom. But an energy efficient solution was found.				
The information about the tariff was obtained during a consultation in the company's office. The reason for choosing was that it doesn't harm the environment.	Criteria are that it's not harming the environment.	2	b	ii
	Tariff was offered by the company (customer before)	2	b	i
Saved electricity over the past 4 years and noted it due to lower bills.	Saved electric energy over the past 4 years.	1	a	
Minimization of energy consumption by using daylight because of economic constraint.	Economic reasons for saving electricity.	1	a	i
The Einsparbonus was received without noting, because the information is not enough visible.	Einsparbonus received but not known. Because it is just shown on the second page.	3	a	i
	Increase visibility	3	a	iv
The tariff was chosen because of the electricity mix.	Renewable energy was a criterion for choosing the tariff.	2	b	ii
Knows a lot about how to save electric energy in her household. Furthermore she is quite frugal adjusting to the daylight for works that she wants to do, using LEDs and switchable plugbars.	Good knowledge and application of measures for energy conservation	1	c	
Einsparbonus was not noticed because it is just written on the second page and the bill is difficult to understand.	Einsparbonus needs to be more visible, because bill is not completely read.	3	a	iv
It is a problem that the meter can't be read by herself.	Complain about the lack of control of the amount of energy consumption.	3	b	i
Information about energy saving options is obtained in the television. The importance of the topic for her is because of experiences in the past. It's a value not to live in the lap of luxury.	Information about potentials through television and intrinsic motivation not to waste energy.	1	c	

Saves electricity but is not stingy.	Cares for the electricity consumption but is not stingy.	1	a	
Basics are less than average because of experience in the youth. Appreciation of what goes beyond it.	Frugality because of past experiences and a resulting appreciation of electric energy.	1	a	
Blames development and lobbyists for higher standard of living because of which people do not appreciate anymore what they have.	It is not only the responsibility of the individuals but also the influence of industry and politics that lead them to consume more.	4	b	
Mistrust in politicians. In western democracies they are perceived to be weak, in former countries of eastern Europe they were powerful but it was not better.	Mistrust in politics to change anything.	4	b	
Politics has no power to change.	Mistrust in politics to change anything.	4	b	
The Einsparbonus is a good measure because people react to monetary incentives.	Einsparbonus welcomed and motivation acknowledged.	3	a	iii
Could have been informed about receiving the Einsparbonus but did not care.	Was probably informed about the premium but didn't care	3	a	i
There is a need for an incentive to make people save, but not all might be incentivized.	The effectiveness of monetary incentives is acknowledged.	3	a	iii
Informed the neighbor about how to save electric energy but her information was not adopted by the neighbor.	Cares for energy consumption and even gives advices to neighbors.	1	c	
Saved in her last years of work to buy new energy efficient appliances. The big fridge was planned to exchange with the daughter's smaller one. It is a problem that the freezer unit can't be switched off separately.	Energy efficiency is a high priority when buying appliances.	1	c	
The freezer is needed to conserve food from time to time.	Can't/ doesn't want to waive a freezer.	1	c	
The Energieladen is known but was not visited.	Energieladen is known. But was not visited.	2	c	i
Effizienzshop is not known.	Effizienzshop is unknown.	2	c	ii

	Uses the eco program in the washing machine, but has reservations against sharing a washing machine with others that are not known.	Uses the eco program in the washing machine, but does not want to share a machine with other people because she does not know them.	1	c	
	Smart Meter would be a measure to inform herself and control the bill.	Smart Meter in home display would be welcomed	3	b	ii
	Is interested in her energy consumption but does not know where to get the information.	Need for feedback	3	b	i
	The energy audit is perceived to be a measure of last resort.	Energy audit seen as a measure of last resort.	3	c	
	The Klimabonus is not known but welcomed.	Klimabonus is appreciated but not known	2	c	v
	The engagement for the environment is welcomed.	The environmental engagement of the company is appreciated.	2	c	vi
5	It is a two-person household.	She cares more for energy saving than her husband.	1	a	
	To save energy dish washer and washing machine are only used when full.	General aware for energy saving in daily live.	1	a	
	Intrinsically motivated to minimize electricity consumption in contrast to other information by her husband. Appliances were exchanged to more energy efficient ones.	Different opinion about energy saving in regard to lighting. Can afford investments in energy efficiency.	1	a	
	She does the housework and has therefore more influence on energy saving.	Major part of the housework done by the wife.	1	b	i
	As the wife is responsible for the housework, she decides when purchasing new appliances.	Wife decides on appliances	1	b	ii
	Another division of labor is not imaginable.				
	The information about KlimaFix was by a leaflet.	Information about KlimaFix by a leaflet.	2	b	i
	The decision for the tariff was made jointly.	Joint decision to take the tariff.	2	b	iii
	The overall concept of the tariff and renewable energy were decisive criteria.	Renewable energy was a criterion for choosing.	2	b	ii
		The overall concept of the tariff is appreciated.	2	b	ii

It was a joint decision to take the tariff.	Joint decision to take the tariff.	2	b	iii
Customer of KlimaFix for 3 years.	Customer of KlimaFix for 3 years.	2	b	iv
General awareness for environmental issues without much knowledge about details.	General awareness for environmental issues.	1	a	
	The Einsparbonus was unknown	3	a	i
Einsparbonus is not known and costs do not play a role.	No motivation: costs do not matter	3	a	ii
There is no potential for further savings that is why the Einsparbonus does not motivate.	No motivation: already saving and no further potential	3	a	ii
The Einsparbonus is too low to be an incentive to change anything else.	No motivation: Reward is too low	3	a	ii
Intrinsic motivation to save energy.	Intrinsic motivation for energy saving.	1	a	
The Einsparbonus needs to be higher to incentivize changes.	Increase of the premium.	3	a	iv
No idea how to achieve the goal of the premium	Exemplify savings	3	a	iv
Monetary incentives are generally perceived negative.	Generally no interest in monetary incentives.	3	a	ii
The Einsparbonus could be an incentive for stingy people.	Monetary incentives work only for certain people.	3	a	iii
The Einsparbonus could work for people that are open for monetary incentives.	Monetary incentives work only for certain people.	3	a	iii
Monetary incentives are perceived to be a waste of time.	No motivation: already saving and no further potential	3	a	ii
No need for an incentive because of intrinsic motivation.	Intrinsic motivation for energy saving.	1	a	
Effective savings could be achieved with the allocation of quotas. But this is seen as a drastic compulsory measure.	Quotas would lead to savings, but are negatively assessed.	3		
The municipality should prioritize other issues like bike lanes over electricity consumption.	Energy saving is assessed to be no policy issue as the price is high and people therefore care about it and other issues are more important.	4	a	

	More frequent feedback on consumption is appreciated if feasible.	More frequent feedback is appreciated.	3	b	iii
	A progressive tariff model would raise the attention of consumers. But justice issues are raised.	Doubts in regard to justice issues related to the progressive model	3	d	
		Progressive tariff is supported and would be effective.	3	d	
	An energy audit is associated with bigger investments than household appliances.	No need for an energy audit with regard to appliances.	3	c	
	The information about new appliances is received in the store.	General trust in information at point of sale.	1	c	i
	The Energieladen is not known.	Energieladen is unknown.	2	c	i
	The Effizienzshop is not known, but interested in it.	Effizienzshop unknown, but interest in it.	2	c	ii
	The additional offers are appreciated because of the environmental benefit, but the interview is not targeted by the existing offers.	Offers not known. Supports additional offers. But not in the target group.	2	c	iii
	Heidelberg GREEN is known and appreciated. No reasons for not choosing it are given.	Heidelberg GREEN was known but is not interested in it.	2	c	iv
	The Klimabonus and the projects are known because of the membership of BUND.	Knows the Klimabonus and the projects.	2	c	v
	The interviewee is a member of BUND	Member of an environmental NGO	1	a	ii
	The environmental engagement is appreciated.	The environmental engagement of the company is appreciated.	2	c	vi
6	High awareness for energy consumption.	High attentiveness to energy demand	1	a	
	In order to save plugbars are used, the house was insulated and solar collectors installed.	Good knowledge and application of measures for energy conservation	1	c	
	The interviewee is highly motivated and thereby influenced his wife.	Both pay attention, but he was perhaps the driving force.	1	a	
	In order to save electric energy a gas stove is used. No dryer is used.	Don't have a dryer, no electric stove (gas).	1	c	

The interviewee shows good knowledge about energy conservation.	Good knowledge and application of measures for energy conservation	1	c	
The housework is shared, but was done by the wife when children were still at home.	Housework shared.	1	b	i
Energy efficiency is an important criterion for purchases for both. Costly appliances can be afforded but are also thought to pay off.	High efficiency standards are important. Costly appliances can be afforded and pay off because of higher efficiency.	1	c	
Was a customer of the energreen tariff. With the introduction of KlimaFix informed by the company.	Tariff was offered by the company (customer before)	2	b	i
Decisive for choosing the tariff was that it's of the 'municipal'/local company, the service it provides, the cooperation with BUND and the former energreen tariff.	Criteria for choosing: local, service, supports BUND and the energreen tariff	2	b	ii
The interviewee is member of BUND.	Member of an environmental NGO	1	a	ii
Heidelberg GREEN was not known, but wants to get it as the interviewee was customer of energreen.	Heidelberg GREEN not known, but interested in it.	2	c	iv
Customer of KlimaFix for 3 to 4 years.	Customer of KlimaFix for 3 to 4 years.	2	b	iv
Decision to take the tariff was made jointly.	Joint decision to take the tariff.	2	b	iii
Good knowledge about energy issues (lifecycle assessment of energy saving bulbs). Most efficient option is preferred.	Good knowledge about energy issues. Applies the most energy efficient option	1	c	
Monetary incentive is not interesting because of intrinsic motivation to save.	No motivation: already saving and no further potential	3	a	ii
Einsparbonus is not known and the procedure how to receive it.	The Einsparbonus was unknown	3	a	i
Shows intrinsic motivation to save.	Intrinsic motivation for energy saving.	1	a	
Problem with the bonus seen in the fact that electric energy consumption is influenced by the climate (heating system has to work more or less)	Energy consumption is highly influenced by external circumstances.	1	c	

Monetary incentives could work for other customers because people are interested in money not their energy consumption.	Monetary incentives work only for certain people.	3	a	iii
The premium increases the attractiveness of the tariff and increases customer loyalty.	Premium is a good instrument to stimulate savings and customer loyalty.	3	a	iii
In order to support people's effort to get the premium it should be coupled with the lending of ammeters and a highly visible advertisement for it. Although it is admitted that it is difficult to use.	Advertise the premium with ammeters because people are not informed enough about their energy demand.	3	a	iv
Wanted to test the electric energy consumption of the freezer, in order to check whether it would be reasonable to exchange.	High attentiveness to energy demand	1	a	
Further ideas of how to link the lending of ammeters with the Einsparbonus are given (manual for the ammeters on the homepage, advertisement in the local newspaper)	Program should be coupled with smart meters and/or energy audits	3	a	iv
More frequent feedback is difficult because of seasonal volatility of the consumption.	Sceptic about a monthly invoice because of seasonal differences.	3	b	iii
The company should make people aware of the energy demand for Christmas lighting via advertisement.	Advice for an energy saving campaign.	2	c	vi
The company should be a local utility. A privatization of public services is rejected.	Company appreciated because it's a 'public' service.	2	a	
The proximity and service of the company are important for the customer.	Proximity of the local utility is appreciated	2	a	
	Service of the company is appreciated.	2	a	
A linear tariff for the industry is preferred over a progressive tariff for private households.	Progressive tariff rejected because private households are the wrong target group.	3	d	
A linear tariff for the industry is an option	Linear tariff for the industry	3	d	

	Did an energy audit before for bigger investments but for appliances it is not used.	No need for an energy audit with regard to appliances.	3	c	
	Information about appliances in stores and the "Stiftung Warentest".	Information at the point of sale.	1	b	iii
		Information through print media.	1	b	iii
	The Energieladen is not known. The company should make more advertisement for it. Interested in the service.	Energieladen is unknown, but positively assessed. Visibility should be increased.	2	c	i
	Effizienzshop is not known, but interested in it.	Effizienzshop unknown, but interest in it.	2	c	ii
	The additional offers are not known and don't target the interviewee.	Offers not known. Not felt to be addressed by.	2	c	iii
7	The environmental engagement and the Klimabonus are appreciated. But the company could do more.	Engagement is positively assessed. But further potential.	2	c	vi
	Highly aware of the own energy demand. No purchase of bigger appliances in the past 10 years. Food is stored in the cellar instead of the fridge.-No new or bigger devices bought, fridge mostly switched off.	High attentiveness to energy demand	1	a	
	Housework is done by the Interviewpartner	All done alone.	1	b	i
	Wanted to stop the contract with the company, but was informed in the office about KlimaFix and therefore decided to take it.	Consulting on the tariff in the company's office	2	b	i
	The interviewpartner became member of an environmental NGO because of interest in environmental issues.	Member of an environmental NGO	1	a	ii
	The Einsparbonus was forgotten because there is no potential for the interviewee to save more. The idea of the premium is appreciated and was decisive for taking the tariff.	Forgot about the premium, because not addressed as already saving.	3	a	i
		Einsparbonus welcomed and motivation acknowledged.	3	a	iii

	No motivation: already saving and no further potential	3	a	ii
Customer of KlimaFix for 4 years.	Customer of KlimaFix for 4 years.	2	b	iv
A criterion for choosing KlimaFix was that electricity is generated by hydro power plants without harming the climate.	Renewable energy was a criterion for choosing the tariff.	2	b	ii
The customer sees no realistic potential for further savings.	No motivation: already saving and no further potential	3	a	ii
Whether a monetary incentive works or not is dependent on the income, but 15 € are too less.	Monetary incentive dependent on the income of people	3	a	iii
	Reward is too low to motivate people.	3	a	iii
The consultancy is of the company is appreciated.	Service of the company is appreciated.	2	a	
For many people 15€ is such a small amount that even when they are told about it is not interesting and therefore quickly forgotten.	Premium is too low to attract attention.	3	a	iii
The premium should be higher and not automatically paid. 15€ is such a small amount that people forget about it.	Application for the premium	3	a	iv
	Increase of the premium.	3	a	iv
	15 € too less to attract attention.	3	a	iii
If the Einsparbonus is left in the current model the visibility should be increased on the bill and through advertisement.	Increase visibility	3	a	iv
The own energy consumption is controlled and compared to higher consumption and waste of others.(no TV, no radio, lights are switched off)	High attentiveness to energy demand	1	a	
The engagement of the company is appreciated. The actions are assessed to be in line with the common good and not for private profit.	The engagement and 'public' service of the company is appreciated.	2	a	

The politics of the municipality are a positive example for good policy-	Municipal policy positively assessed.	4	a	
The current payment model is questioned because it rewards people for consuming more. At least a linear model demanded.	Linear/progressive model appreciated.	3	d	
The progressive model is one of the best ideas. It could be the only solution that leads to a lower energy demand.	Progressive tariff is supported and would be effective.	3	d	
Is skeptical about profit and observes that more and more people are in line with his thoughts (common welfare economy)				
The ones that consume more are the ones that have more money. That is why no justice problems are seen with regard to a progressive model.	No justice problems are noted for the progressive model. Consumers who demand more have to pay more.	3	d	
No need for feedback for the interviewee because he knows how to read the meter. Ideas for improvement because of possible needs of others: smart meter display, monthly invoice, "how to read the meter"	No personal need for feedback. But possible need for other people recognized	3	b	i
The information known and welcomed.	Information known and positively assessed.	3	b	v
Information about appliances is obtained in "Stiftung Warentest" or "Stiftung Ökotest" magazine	Information through print media.	1	b	iii
The Energieladen is known, but does not feel addressed by it. But it could be important for other people.	Energieladen is known, but feels not addressed by it. Useful for others.	2	c	i
The Effizienzshop was not known but is appreciated.	Effizienzshop unknown, but interest in it.	2	c	ii
Additional offers stimulate people to think about their energy consumption, that is why they are positive.	Additional offers are positively assessed, to make people think about energy consumption.	2	c	iii

	Heidelberg GREEN is fairly known and positively assessed. But does not have the financial means.	Heidelberg GREEN was known but is not interested in it.	2	c	iv
	Was informed about it but forgot the exact information.	Klimabonus is known.	2	c	v
	It is good what the company does, although it is difficult to judge the scope of it. Proposes that the municipality should do more in order to make people save more.	The municipality should do more for higher energy savings.	4	a	
		Engagement is positively assessed. But further potential.	2	c	vi
		Municipal politics should act more.	4	a	
8	Energy conservation is associated with energy efficiency.	Energy conservation is linked to energy efficiency.	1	c	
	General attention is paid to energy conservation.	General aware for energy saving in daily live.	1	a	
	General awareness for energy consumption but no special measures mentioned.	Knows somewhat about energy conservation.	1	c	
	Husband is responsible at the moment. But shared.	Housework shared.	1	b	i
	Appliances are bought together because of changing responsibility for housework.	Joint decision for appliances	1	b	ii
	Housework is shared according to the work situation.	Housework shared.	1	b	i
	Information in the internet about green electricity suppliers. Were customers of another green supplier years before leaving Germany.	Information about KlimaFix in the internet.	2	b	i
		Renewable energy was a criterion for choosing the tariff.	2	b	ii
	The most important factor for choosing the tariff was renewable energy.	Renewable energy was a criterion for choosing the tariff.	2	b	ii
	Wants the company to know that renewable energy is wanted and supported.	Show the local utility company that renewable energy is supported.	2	b	ii
	Decision was made jointly.	Joint decision to take the tariff.	2	b	iii
	Customer of KlimaFix for about 2 years.	Customer of KlimaFix for 2 years.	2	b	iv

Has never heard about the premium and does not feel addressed by it because the household already tries to save. It is not known where could be saved more. The goal of 15% is perceived to be unachievable.	The Einsparbonus was unknown	3	a	i
	No motivation: already saving and no further potential	3	a	ii
	The high goal might discourage people	3	a	iii
Decision for the local company because of proximity.	Proximity was a criterion for choosing.	2	b	ii
The proximity of the company is a reason to be a customer.	Proximity of the local utility is appreciated	2	a	
The interviewee doesn't know how to achieve the premium and 15% are perceived to be a lot.	The high goal might discourage people	3	a	iii
	Exemplify savings	3	a	iv
The premium should be tiered in order that the interviewee feels able to achieve the goal. The monetary reward is perceived to be rather symbolically.	Tiered model suggested	3	a	iv
	The monetary incentive is symbolically.	3	a	ii
When moving new energy efficient appliances were bought.	Energy efficiency is a high priority when buying appliances.	1	c	ii
It is a principle to choose energy efficient appliances.	Intrinsic motivation to buy efficient devices.	1	a	i
In some sectors (light bulbs) inefficient products are banned.				
Lights are switched off, eco program in appliances are used and just food for which it is necessary is stored in the fridge.	Good knowledge and application of measures for energy conservation	1	c	
The bonus is positive but was not known. People have to know about it to save. For the own household 15% are assessed to be a lot.	Einsparbonus welcomed and motivation acknowledged.	3	a	iii
	Increase visibility	3	a	iv
The premium is supposed to be a political measure.	Premium as a political measure.	3	a	iii

Behind the premium is a political motive. If the company is owned by the municipality, the municipality should use it to transfer the political will to the citizens.	Municipal politics should influence the company. Advantage that it is controlled by municipality.	4	a	
The municipality should exert influence on municipal companies. This is the task of politics, to shape the conditions with the means they have, besides legislative measures.	Municipal politics should influence the company. Advantage that it is controlled by municipality.	4	a	
The information was not known but it is welcomed. The information was not seen because it is on the last page.	Information should be more visible and easier to understand	3	b	v
	Information on the bill is not known.	3	b	v
There is no perceived need for more feedback, because the option of controlling the consumption with an ammeter and where to get it is known.	Feedback not needed, because knows about option to control consumption with ammeter.	3	b	i
More frequent feedback could be some kind of assistance that would motivate.	More frequent feedback is appreciated.	3	b	iii
A progressive tariff model is perceived to be a stronger measure than the premium but is welcomed. But it is a strong compulsory measure.	Progressive tariff is supported and would be effective.	3	d	
The topic of energy conservation is underrepresented in the political discussion because of the discussion about renewable energy. But it is because the idea of restraint is not as popular as making things cheaper and more effective.	Politicians and media should speak more about the topic to make people aware	4	b	
Information about appliances in the store or in the internet.	Information at the point of sale.	1	b	iii

	The Energieladen is known and was visited because of personal ties to employees. But it is not clear for the customer why it exists, because no additional value to the office is noted.	Energieladen known, but reasonability questioned. Not positively assessed because missing usefulness.	2	c	i
	Effizienzshop is unknown.	Effizienzshop is unknown.	2	c	ii
	The Effizienzshop should be more present, because it is not known. Higher trust in offers of the company.	Effizienzshop is unknown, but interest in it. Higher visibility demanded.	2	c	ii
	The offers are not known. The interviewee is not targeted.	Offers not known. Not felt to be addressed by.	2	c	iii
	Did not know Heidelberg GREEN, but thinks it is good.	Heidelberg GREEN not known but positively assessed.	2	c	iv
	The Klimabonus is not known by the customer.	Klimabonus not known	2	c	v
	The tariff was chosen because the environmental engagement is appreciated.	The environmental engagement of the company is appreciated.	2	c	vi
9	Is aware of his energy consumption and tries to apply new technologies in order to save energy.	High attentiveness to energy demand	1	a	
	Tries to apply new technologies to save energy.	Energy efficiency is a high priority when buying appliances.	1	c	ii
	Tries to use highly efficient appliances wherever possible.	Energy efficiency for energy conservation and intrinsic motivation.	1	c	
	High energy efficiency is important when buying new appliances.	Energy efficiency is a high priority when buying appliances.	1	c	
	Most appliances are used by both (except dryer), that is why decision is made jointly.	Joint decision for appliances	1	b	ii
	The dryer is used by the wife and not abdicable.	Drying done by the wife. (dryer not abdicable)	1	b	i
	Housework is generally shared (apart from some exceptions).	Housework shared.	1	b	i
	Leaflet about KlimaFix probably received with the yearly bill.	Information about KlimaFix by a leaflet (was customer before)	2	b	i

Price stability was a reason for choosing the tariff.	Price stability was a criterion for choosing.	2	b	ii
Support of renewable energy and rejection of nuclear energy were decisive for choosing the tariff.	Renewable energy was a criterion for choosing the tariff.	2	b	ii
The interviewee tries to realize his political beliefs in his daily life, such as the support for renewable energy.	Intrinsic motivation for energy saving.	1	a	i
They were customers of the company before and see the proximity as a clear advantage.	Proximity was a criterion for choosing.	2	b	ii
The proximity of the company is an advantage.	Proximity of the local utility is appreciated	2	a	
Personal preference for the local company due to former job in the municipal administration.	Personal preference for local utility.	2	a	
Regrets that the local utility is no longer a municipal company because of European law as things become more complex by that.	A municipal company is preferred over the liberal market with many companies, because it can be steered.	4	a	
The municipality did investments in renewable energy which is welcomed.	Municipal policy positively assessed.	4	a	
The decision was done by the husband, because financial matters are his responsibility.	It was the husband's decision to take the tariff.	2	b	iii
Customer of KlimaFix for 4 years.	Customer of KlimaFix for 4 years.	2	b	iv
The premium is unknown and also whether it was received or not, because it could have been received without knowing.	The Einsparbonus was unknown	3	a	i
The reward is too low to stimulate any actions.	No motivation: Reward is too low	3	a	ii
The interviewee is generally not interested in monetary incentives.	Generally no interest in monetary incentives.	3	a	ii

Monetary incentive is perceived negatively.	Monetary incentive negatively assessed.	3	a	ii
A premium of 50-100€ could stimulate changes, because now it is calculated to be 1.2€ per month.	Increase of the premium.	3	a	iv
The laptop is switched off and not left standby.	Relatively attentive to energy consumption. Tries not to waste electric energy	1	a	
Differences in energy saving behavior with regard to cooking,	Differences in behavior between wife and husband in respect to energy conservation	1	c	i
The dryer is not abdicable but could be more efficient.	Dryer not abdicable.	1	c	i
Wife does not apply the eco-program as often as the husband.	Differences in behavior between wife and husband in respect to energy conservation	1	c	i
Differences in energy saving behavior with regard to cooking,	Differences in behavior between wife and husband in respect to energy conservation	1	c	i
The existing voucher campaign for appliances is not known but would appreciate vouchers.	Existing voucher is not known	2	a	
	Voucher campaigns would be welcomed.	2	c	iii
The voucher for pedicels is known and seen positively.	Offer positively assessed and known.	2	c	iii
The premium is too low to attract attention and stimulate action.	No motivation: Reward is too low	3	a	ii
The former municipal companies should not operate without the political steering of the municipality. The municipality should set priorities. The privatization of former municipal companies is negatively assessed.	Municipal politics should influence the company. Advantage that it is controlled by municipality.	4	a	
Interest in controlling the demand of appliances with an ammeter but problems to use the ammeter.	Good knowledge and application of measures for energy conservation	1	c	
An online platform would be good.	Online platform would be welcomed	3	b	iv

	Would support in-Home-displays of smart Meters and use it, because it is more convenient than the meter in the cellar.	Smart Meter in home display would be welcomed	3	b	ii
	The information is known and welcomed. The problem with more frequent bills is that they wouldn't be read completely.	Information known and positively assessed.	3	b	v
		More frequent bill negatively assessed, because too much to read.	3	b	iii
	A progressive model that favors lower consumption would be welcomed.	Progressive tariff is supported and would be effective.	3	d	
	There are problems seen with the progressive model regarding outer circumstances that would disadvantage some. Instead a linear model is proposed.	Linear model would be preferred.	3	d	
		Doubts in regard to justice issues related to the progressive model	3	d	
	Not much information needed, because appliances are chosen from a certain manufacturer because of experiences in the past.	Past experience decisive when deciding about a purchase	1	b	iii
	Information is obtained from advertisement and "Stiftung Warentest".	Information in the media.	1	b	iii
	The Energieladen is not known, but it is appreciated that the service exists.	Energieladen is unknown.	2	c	i
	The Effizienzshop is not known, but would like to inform himself about it.	Effizienzshop is unknown, but interest in it. Higher visibility demanded.	2	c	ii
	Is perhaps already a GREEN customer.	Already a customer of Heidelberg GREEN?	2	c	iv
	The Klimabonus is not known by the customer.	Klimabonus not known	2	c	v
	The environmental engagement of the company is important and good.	The environmental engagement of the company is appreciated.	2	c	vi
10	In the daily life not too much attention is paid to energy conservation, but when buying new appliances energy efficient ones are chosen.	No attention in the daily life but general interest in the topic.	1	a	

Energy consumption is not controlled in the daily live because efficiency is seen more important.	Energy efficiency is a high priority when buying appliances.	1	c	
One tariff for the household and further tenants.	Personal energy consumption difficult to control due to tenants.	1	c	
The information on the bill is known but there are problems because of the other tenants in the house to compare it directly with the values given.	Knows the information on the bill and uses it.	3	b	v
The electricity demand could fluctuate highly because of the usage of self-produced electricity.	Possibly bigger differences due to use of photovoltaic electricity generated in the house.	1	c	
		3	a	
Energy efficient appliances are bought.	Interest in energy efficient appliances	1	c	
KlimaFix was advertised. That is why the customer decided to go to the company's office for more information.	KlimaFix was advertised and consulting in the office	2	b	i
Decision for KlimaFix because it's more economical.	Economic criteria for choosing.	2	b	ii
The customer is interested in the "Energiewende" and renewable energy is appreciated.	Renewable energy was a criterion for choosing the tariff.	2	b	ii
Energy efficiency is an important criterion for purchases.	Energy efficiency is a high priority when buying appliances.	1	c	ii
The Einsparbonus is not known.	The Einsparbonus was unknown	3	a	i
The reward is not adequately high when compared with the high goal.	No motivation: the effort to achieve the goal and reward not appropriate	3	a	ii
The interviewee is not motivated to act by the premium.	No motivation: Reward is too low	3	a	ii
There are further tenants living in the house, which would also have to control their consumption.	Personal situation inhibits direct control for household.	3	a	ii

The house is shared with other tenants, which makes it difficult to control the energy demand.	Personal situation inhibits direct control for household.	3	a	ii
Customer of KlimaFix for 2 years.	Customer of KlimaFix for 2 years.	2	b	iv
It was the husband's decision to take the tariff.	It was the husband's decision to take the tariff.	2	b	iii
The customer feels connected to the region. The reason for choosing the tariff is that he wants to support the infrastructure and the municipality.	Proximity and ties to the municipality as criteria for choosing the tariff.	2	b	ii
The low premium does not make people think about their demand, because the money could be saved more easily with other measures.	Premium is too low to attract attention.	3	a	iii
With an increased premium the interviewee would be motivated to save although personal difficulties, the high goal and the long period are discouraging.	Increase of the premium.	3	a	iv
	Increase of the premium.	3	a	iv
	The high goal might discourage people	3	a	iii
	Feedback on demand would be needed.	3	a	iii
Increased the premium of 50 € would motivate	Increase of the premium.	3	a	iv
In principle the Einsparbonus is assessed to be good but also companies should save more.	In principle positive assessment of the idea of the premium, but companies should save.	3	a	iii
Politics should address industry not private households because effects would be larger.	Politics should address industry and "big" consumers (industry, streetlights, traffic lights) not private households.	4	b	
Is not interested to know more about his electricity demand and is therefore not interested in more frequent feedback.	No personal need for a more frequent feedback.	3	b	i
A monthly invoice would not induce any change in consumption behavior as long there is no bigger difference in consumption level.	Monthly invoice would not change behavior.	3	b	iii
The progressive model is perceived to be compulsory but	Progressive model is a strong compulsory measure.	3	d	

	it might be a necessary regulation.	Progressive tariff is supported and would be effective.	3	d	
	The interviewee thinks that they wouldn't be affected negatively by a progressive model.	Indifferent about progressive tariff.	3	d	
	Behavior is seen not to be important to save. Energy efficient devices are sufficient.	Energy efficiency is important not conservation behavior.	1	c	
	Energy efficient circulation pump was bought even though it was more expensive.	Willingness to pay more for efficient devices and can afford it.	1	c	ii
	The offer for the exchange of heating pumps is appreciated.	Offer is positively assessed	2	c	iii
	Vouchers for pedicels are rejected because of additional demand-	Vouchers for pedicels rejected (people should cycle)	2	c	iii
	Vouchers for efficient appliances should be offered instead.	Voucher campaigns would be welcomed.	2	c	iii
	The interviewee asks since when the Energieladen exists, because it is not known.	Energieladen is unknown.	2	c	i
	Supports energy conservation and the idea of the shop, but did not know the shop.	Effizienzshop is unknown, but interest in it.	2	c	ii
	All customers should pay for new plants if they are needed.	Not interested in Heidelberg GREEN, because all customers should pay for it.	2	c	iv
	The exemptions from paying for renewable energy for industry are condemned. National politics is assessed to be contradictory with regard to new coal power plants in Saxony.	National policy negatively assessed	4	b	
	Pays carefully attention to energy consumption in the daily life and when purchasing new appliances.	High attentiveness to energy demand	1	a	
11	Light switched off and energy efficient appliances in order to save energy	Good knowledge and application of measures for energy conservation	1	c	
	The wife is more consequently applying energy saving measures.	Wife is more motivated.	1	a	

Switchable plugbars, computer switched off, light switched off in order to save energy	Good knowledge and application of measures for energy conservation	1	c	
Husband is responsible to control the bill and the consumption over the years.	Responsibility of the husband to control the bill.	1	b	i
The work is mainly done by the wife.	Major part of the housework done by the wife.	1	b	i
The wife cares for the energy efficiency of the appliances but decisions are made together.	Joint decision for appliances	1	b	ii
The wife is generally aware of environmental issues and intrinsically motivated to save energy.	Intrinsic motivation for energy saving.	1	a	i
The environmental aspect of the tariff is the most important one.	A criterion is that it's not harming the environment.	2	b	ii
Information about KlimaFix was provided by a leaflet. The interviewee was a customer before.	Information about KlimaFix by a leaflet (was customer before)	2	b	i
Has personal contact to the CEO and has always been a customer.	Proximity and loyalty to the company was a criteria for choosing	2	b	ii
Can afford the tariff	Affordability of KlimaFix	2	b	ii
Support of renewable energy and investments in new generation capacity were important criteria for choosing the tariff.	Renewable energy was a criterion for choosing the tariff.	2	b	ii
Probably already a customer of Heidelberg GREEN, because pays a surcharge for solar power plants.	Already a Heidelberg GREEN customer?	2	c	iv
The decision to take the tariff was made jointly.	Joint decision to take the tariff.	2	b	iii
Does not know exactly but states that it is about 5 years that they have the tariff.	Customer of the tariff for about 5 years	2	b	iv

Feels connected to his home region and therefore feels obliged to stay a customer of the local company.	Proximity and ties to the municipality as criteria for choosing the tariff.	2	b	ii
Personal ties to the region a positive assessment of the activities of the company in the past years.	Proximity of the local utility is appreciated	2	a	
	The engagement of the company is appreciated.	2	a	
The premium is not known by the interviewee.	The Einsparbonus was unknown	3	a	i
The goal is perceived to be high and it is not known how to achieve it. But would think about options to lower the demand.	No motivation: goal is perceived to be high	3	a	ii
	In principle motivated.	3	a	ii
	The high goal might discourage people	3	a	iii
	Exemplify savings	3	a	iv
The idea of the premium is very good, but it is questioned whether the goal could be achieved, because the interviewee already tries to save and doesn't know any further options.	Einsparbonus welcomed and motivation acknowledged.	3	a	iii
	No motivation: already saving and no further potential	3	a	ii
The visibility of the premium and additional offers could be increased with a leaflet sent to the customers once a year summarizing all these.	Joint leaflet with all bonuses and premiums advocated to improve visibility.	3	a	iv
The monetary incentive could generally stimulate people to save but the reward is too low in comparison with the goal of 15% which is perceived to be high.	No motivation: the effort to achieve the goal and reward not appropriate	3	a	ii
	Increase of the premium.	3	a	iv
A tiered model but with a higher premium is suggested.	Tiered model suggested	3	a	iv
The wife could be stimulated by the premium but in general 15€ is assessed to be too less. It's just stimulating people with a high intrinsic motivation.	Reward is too low to motivate people.	3	a	iii
	Reward could stimulate intrinsic motivation, but not in order to gain the reward	3	a	ii
An improvement of the scheme is would be appreciated.	An improvement of the scheme is would be appreciated.	3	a	iv

No dryer, outside fridge, energy efficiency appliances in order to save energy.	Good knowledge and application of measures for energy conservation	1	c	
The higher electricity consumption might be caused by electric boilers to heat the water.	Water heated in electric boiler (high demand)	1	c	
It is good that the company acts like that, but questioned how money is earned.	The environmental engagement of the company is appreciated.	2	c	vi
It is the general political environment that drives also the activities of the company.	Politics indirectly influences company.	4	a	
Financial resources possibly freed from former subsidies for other parts of the company.				
There is no need for more frequent feedback, because demand is not controlled from day to day but with a retrospect on the past year.	No need for more frequent feedback	3	b	i
A monthly feedback would not change anything and would waste too much paper. But an overview at the end of the year with the demand of every month would be helpful.	No need for more frequent feedback but a more detailed overview.	3	b	i
The progressive tariff model is a good idea and would be more effective than a premium. The tiers would need to be realistically determined.	Progressive tariff is supported and would be effective.	3	d	
The progressive tariff model is compulsory in contrast to the premium but it would be a better incentive to save. Compulsory measures are not rejected.	Progressive tariff is supported and would be effective.	3	d	
Efficiency labels as an orientation when buying new appliances.	Efficiency labels as information.	1	b	iii
Past experiences with manufactures influence the decision.	Past experience decisive when deciding about a purchase	1	b	ii

	The interviewee knows the Energieladen and talked with others about it. But he heard that employees are not very competent.	Energieladen is known but slightly negatively assessed (for the employees)	2	c	i
	Better coordination or a joint initiative is required with regard to energy audits as there are already existing offers but the responsibilities are confusing.	Better coordination or joint initiative for energy audits	4	a	
	Effizienzshop is unknown.	Effizienzshop is unknown	2	c	ii
	The offers are positively assessed, because the couple thought about buying a pedelec.	Offer positively assessed and known.	2	c	iii
	All premiums and offers should be summarized on one leaflet to increase the visibility.	Joint leaflet with all bonuses and premiums advocated to improve visibility.	3	a	iv
	Generally good impression of the engagement. The whole concept is more important than the price and the concept is good. High trust in the company.	The environmental engagement of the company is appreciated.	2	c	vi
12	The interviewee is relatively aware of energy in order not to waste energy.	Relatively attentive to energy consumption. Tries not to waste electric energy	1	a	
	Switchable plugbars are applied, lights are switched off and the cooking temperature is regulated early.	Good knowledge and application of measures for energy conservation	1	c	
	Husband cares more for energy consumption.	Higher awareness of the husband	1	a	
	Housework is shared but the bigger part is done by the wife.	Major part of the housework done by the wife.	1	b	i
	The wife has more influence when deciding on new appliances.	Wife decides on appliances	1	b	ii
	The tariff was advertised with a poster or a leaflet.	Advertisement with poster or leaflet for KlimaFix	2	b	i
	Supports renewable energy and investments in new generation capacities by the company.	Renewable energy was a criterion for choosing the tariff.	2	b	ii
	The interviewee chose to take the tariff.	It was the husband's decision to take the tariff.	2	b	iii

Does not know exactly but it is about 4 years that they have the tariff.	Customer of KlimaFix for 4 years.	2	b	iv
The contract was chosen because the interviewee feels connected to the region and wants to support the company that is responsible for public services.	Proximity and ties to the municipality as criteria for choosing the tariff.	2	b	ii
The Einsparbonus is known.	Einsparbonus is known	3	a	i
The Einsparbonus was not received because demand increased.	Einsparbonus not received	3	a	i
The interviewee tries to save energy independently of incentives and sees no further potential. Additionally the demand is dependent on external factors as time spent at home.	No motivation: already saving and no further potential	3	a	ii
	Intrinsic motivation for energy saving.	1	a	
	Exemplify savings	3	a	iv
It is difficult to control the consumption level because it is perceived to be mainly dependent on the amount of time spent at home.	Energy consumption is highly influenced by external circumstances.	1	c	
The Einsparbonus should be linked with other offers like energy audits, other options to control the demand or with tips how to achieve the goal.	Program should be coupled with smart meters and/or energy audits	3	a	iv
	Exemplify savings	3	a	iv
The reward should be 100-200€ to be effective in stimulating people.	Increase of the premium.	3	a	iv
The interviewee is skeptical about a tiered model.	Tiered model not positively assessed	3	a	iv
The advantage of a municipal company is that it can be steered by the municipality. The premium could be driven by municipal policy. It is an advantage but also problematic that politicians are also in the board of the company.	Municipal politics should influence the company. Advantage that it is controlled by municipality.	4	a	
A monthly invoice would be helpful to get a better overview.	More frequent feedback is appreciated.	3	b	iii

National politics could do more for energy conservation particularly subsidies (for energy efficient appliances, initiatives for energy conservation and climate friendly tariffs) are advocated.	National politics could do more for energy conservation	4	b	
The information on the bill is not known because the bill is too long and confusing for the interviewee.	Information on the bill is not known.	3	b	v
	Information should be more visible and easier to understand	3	b	v
The information should be more visible in order to attract more attention and the bill better understandable.	Information on the bill is not known.	3	b	v
	Information should be more visible and easier to understand	3	b	v
The interviewee asks where the Energieladen is located because it is not known.	Energieladen is unknown.	2	c	i
The Energieladen is not known but positively assessed.	Energieladen is unknown, but positively assessed. Visibility should be increased.	2	c	i
The customer does not know the Effizienzshop.	Effizienzshop is unknown	2	c	ii
The offers are positively assessed, but do not address the interviewee's needs.	Offers not known. Supports additional offers. But not in the target group.	2	c	iii
Heidelberg Green was not known, but is interested in it.	Heidelberg GREEN not known, but interested in it.	2	c	iv
Was informed about it but forgot the exact information.	Klimabonus is known.	2	c	v
The engagement is still too less.	Engagement could be increased.	2	c	vi
It is proposed that the electricity mix of KlimaFix should also include solar and wind power.	Improvements of the tariff suggested.	2	a	v

Appendix F – Generalization and Reduction of the Interviews

Category			Reduction	Generalization
1	a		<ul style="list-style-type: none"> • Intrinsic motivation to save • Member of an NGO • Economic reasons to save electricity (limited budget) • Frugality because of past experiences and a resulting appreciation of electric energy • High attentiveness to energy demand • The own demand is perceived to be average • General aware for energy saving in daily live. • General awareness for environmental issues. • Intrinsic motivation to buy efficient devices. 	<p>Attentiveness of customers to their electricity consumption increases:</p> <ul style="list-style-type: none"> • when customers are intrinsically motivated • when they know saving measures • when they are members of environmental NGOs • because of experiences of scarcity in the past • because of economic reasons • when they are generally aware of environmental issues
1	a		<ul style="list-style-type: none"> • Not attentive because of missing measures to control consumption • Not attentive because energy saving is associated with restraint, but minimization of waste • Reduced attentiveness, "bigger" consumers are seen to be more important 	<p>Reduced attentiveness is related to:</p> <ul style="list-style-type: none"> • no ability to control the demand, that means an stated need for feedback • an attitude that shifts the responsibility to the observed waste of "big" consumers (industry) • association of energy saving to restraint
1	b	i	<ul style="list-style-type: none"> • Housework done by the wife • housework done by the husband • housework is shared • Housework all done alone. • Joint decision for appliances • Decision about appliances alone. • Wife decides on appliances 	<p>The house labor is done by the woman:</p> <ul style="list-style-type: none"> • in case of older couples • when children are still at home • when living alone <p>The house labor is done by the man:</p> <ul style="list-style-type: none"> • when he is living alone • in case of younger couples when he is the one who is more time at home (home office, caring children) <p>The house labor is shared:</p> <ul style="list-style-type: none"> • in case of younger couples • in case of older couples when children moved out

1	b	ii		<p>The decision on new appliances is influenced:</p> <ul style="list-style-type: none"> • by the person who generally uses it • by the person who cares more for energy conservation • by experiences on durability and quality in case of older couples <p>Information on new appliances:</p> <ul style="list-style-type: none"> • is obtained at the point of sale • in print media (Stiftung Warentest/Öko-Test) • in the Internet
1	b	iii	<ul style="list-style-type: none"> • Information in the internet • Information at the point of sale. • Past experience decisive when deciding about a purchase • Efficiency labels as information. 	Energy efficiency label was known by all interviewees.
1	c		<ul style="list-style-type: none"> • Good knowledge about energy saving options, but does not yet translate all options into action. • Awareness that options are still not fully exploited. • Good knowledge and application of measures for energy conservation • 	<p>Energy conservation is done through:</p> <ul style="list-style-type: none"> • Switchable plugbars for stand-by appliances • Eco-programs in dishwasher and washing machine • Investment in energy efficient appliances • Foregoing a dryer • Foregoing a freezer (even refrigerator) • Investment in induction or gas stove • Early regulation of cooking temperature • Giving advices to neighbors <p>Investment in energy efficient appliances depends on:</p> <ul style="list-style-type: none"> • the income of the households • the willingness to exchange old (still working) appliances with energy efficient ones
1	c	i	<ul style="list-style-type: none"> • No purchase of appliances that are oversized. • Differences in behavior between wife and husband in respect to energy conservation • New appliances are energy efficient but still old ones. 	
1	c	ii	<ul style="list-style-type: none"> • Energy efficiency is a high priority when buying appliances. • Economic reasons for energy efficient appliances. • Willingness to pay more for efficient devices and can afford it. 	

2	a		<ul style="list-style-type: none"> • Service of the company is appreciated. • Company appreciated because it's a 'public' service. • Proximity of the local utility is appreciated • The engagement and 'public' service of the company is appreciated. • Personal preference for local utility. 	<p>Features of the local utility company that are appreciated:</p> <ul style="list-style-type: none"> • good service • the proximity • that it provides 'public' services. It is still associated with the former municipal company.
2	b	i	<ul style="list-style-type: none"> • Information about KlimaFix by leaflet. • Tariff was offered by the company (customer before) • Consulting on the tariff in the company's office • Information about KlimaFix in the internet. • KlimaFix was advertised and consulting in the office • Advertisement with poster or leaflet for KlimaFix 	<p>The customers were informed about the KlimaFix tariff:</p> <ul style="list-style-type: none"> • through information in a leaflet • direct offer by the company (were customers before) • information in the internet • poster advertisement • consulting of the company
2	b	ii	<ul style="list-style-type: none"> • Proximity and loyalty to the company was a criterion for choosing • Renewable energy was a criterion for choosing the tariff. • Comfortability was a criterion for choosing. • Price stability was a criterion for choosing. • Criterion is that it's not harming the environment. • The price as criteria for choosing the tariff. • The overall concept of the tariff is appreciated. • Criteria for choosing: local, service, supports BUND and the energreen tariff • Show the local utility company that renewable energy is supported. • Economic criteria for choosing. 	<p>Criteria to choose the tariff:</p> <ul style="list-style-type: none"> • Electricity from renewable sources • Electricity from a hydro power plant • proximity and connection of the company to the region • the service • price stability • electricity generation is not harming the environment • support of the local environmental NGOs • the energreen tariff • the loyalty and year-long connection to the company • Economic criteria • the overall concept of the tariff
2	b	iii	<ul style="list-style-type: none"> • It was the wife's decision to take the tariff. • Joint decision to take the tariff. • It was the husband's decision to take the tariff. 	<p>The decision to take the tariff:</p> <ul style="list-style-type: none"> • was in most cases a joint decision <p>Reasons for no joint decision:</p> <ul style="list-style-type: none"> • the deciding person is responsible for the financial concerns • the deciding person is the one that cares more for environmental issues
2	b	iv	<ul style="list-style-type: none"> • Customers of KlimaFix for 3 years • Customer of KlimaFix for 3 to 4 years. • Customer of KlimaFix for 2 years. • Customer of the tariff for about 5 	<p>Most customers have the tariff almost since its introduction (were customers before)</p>

			years	
2	c	i	<ul style="list-style-type: none"> • Energieladen is unknown, but interested in it. • Energieladen is known. But was not visited. • Energieladen is known, but feels not addressed by it. Useful for others. • Energieladen known, but reasonability questioned. Not positively assessed because missing usefulness. • Energieladen is known but slightly negatively assessed (for the employees) 	<p>Customers who know the Energieladen:</p> <ul style="list-style-type: none"> • Did not visit it • Did not know what is offered there • Did visit it but did not understand why the company established it and what it is for. • Do not feel addressed by it, but think it might be useful for others • Did mention a rumor about a lack of competence <p>Customers who did not know the Energieladen:</p> <ul style="list-style-type: none"> • Are interested in it • Said that the company should inform the customers better (local newspaper) • Did appreciate the engagement
2	c	ii	<ul style="list-style-type: none"> • Effizienzshop unknown, but interest in it. • Higher visibility demanded of the shop demanded. 	Interviewees did not know the Effizienzshop, but were interested in it, appreciated the service and demanded more advertisement and information about it.
2	c	iii	<ul style="list-style-type: none"> • Offers not known. Supports additional offers. But not in the target group. • The offer is ok, but no interest in it. • Additional offers are positively assessed, to make people think about energy consumption. <ul style="list-style-type: none"> • Vouchers for pedelecs rejected (people should cycle) 	<p>Additional offers are:</p> <ul style="list-style-type: none"> • known by many customers • generally appreciated • thought to make people think more about their energy consumption <p>But customers state that:</p> <ul style="list-style-type: none"> • they are not targeted by the offer (no own house) • there should be offers for other target groups • they want offers for energy efficient appliances • questioned the voucher for pedelecs
2	c	iv	<ul style="list-style-type: none"> • Heidelberg GREEN is not known and no interest in it • Knows GREEN product but is not interested in it. • Heidelberg GREEN not known, but interested in it. • Heidelberg GREEN not known but positively assessed. • Already a customer of Heidelberg GREEN? • Not interested in Heidelberg GREEN, because all customers should pay for it. 	<p>Customers that don't know about Heidelberg Green:</p> <ul style="list-style-type: none"> • are interested in it • think they already are customers of this offer • reject it and demand that all customers should pay for new power generation capacities • know that the company is active in this field <p>Customers who are not interested in Heidelberg GREEN:</p> <ul style="list-style-type: none"> • have other priorities to spent their money (donation to NGO) • have a negative image of photovoltaics • have a limited budget

2	c	v	<ul style="list-style-type: none"> • Klimabonus is appreciated but not known • Knows the Klimabonus and the projects. • Klimabonus not known 	Although the Klimabonus is only known by a half of the interviewees, it is generally appreciated.
2	c	vi	<ul style="list-style-type: none"> • The environmental engagement of the company is appreciated. • Advice for an energy saving campaign. • Engagement is positively assessed. But further potential. • Engagement could be increased. • Existing voucher is not known • Improvements of the tariff suggested. 	<p>Additional remarks of customers with regard to the engagement of the company:</p> <ul style="list-style-type: none"> • The engagement for the is positively assessed • Improvements of the tariff are suggested (other renewable sources) • The engagement could be more • The tariff was chosen because the engagement is good • An advice for an energy saving campaign is given • The existing voucher campaign for energy efficient appliances is not known
3	a		<ul style="list-style-type: none"> • Possibly bigger differences due to use of photovoltaic electricity generated in the house. • Quotas would lead to savings, but are negatively assessed. 	<p>Additional remarks of customers with regard to interventions:</p> <ul style="list-style-type: none"> • Electricity produced with an owned photovoltaic system could lead to receiving the premium • Quota would lead to savings, but are negatively assessed.
3	a	i	<ul style="list-style-type: none"> • The Einsparbonus was unknown. • Einsparbonus received but not known. Because it is just shown on the second page. • Was probably informed about the premium but didn't care • Forgot about the premium, because not addressed as already saving. • Einsparbonus is known 	<p>Einsparbonus is not known by most customers:</p> <ul style="list-style-type: none"> • although they might have been informed, but forgot about it • Customers received the bonus but did not know, as bill was not read completely • Was probably informed about the premium but didn't care <p>Customers who knew the Einsparbonus:</p> <ul style="list-style-type: none"> • felt not addressed by it, because the consumption level is already low • just stated that it is known.
3	a	ii	<ul style="list-style-type: none"> • In principle motivated • No motivation: already saving and no further potential • No motivation: Reward is too low • Premium too low to stimulate investments in energy efficiency. • Einsparbonus stimulates reflection about energy consumption but does not motivate. • No motivation: costs do not matter • Generally no interest in monetary incentives. • The monetary incentive is symbolically. • Monetary incentive negatively assessed. • No motivation The Effort to achieve the goal and reward not 	<p>Customers admit that the Einsparbonus is a potential motivation to save, but:</p> <ul style="list-style-type: none"> • would just intent to achieve the goal, but not for the reward because already intrinsically motivated. <p>Customers are not motivated by the premium because:</p> <ul style="list-style-type: none"> • they see no further saving potentials • Premium is too low • Goal is too high • the effort to achieve the goal is not adequately rewarded • they are already intrinsically motivated • monetary incentives in general have a negative image • Premium is too low to stimulate

			<p>appropriate</p> <ul style="list-style-type: none"> • Personal situation inhibits direct control for household. • No motivation: goal is perceived to be high • Reward could stimulate intrinsic motivation, but not in order to gain the reward 	investments
3	a	iii	<ul style="list-style-type: none"> • Einsparbonus welcomed and motivation acknowledged. • Feedback on demand would be needed. • Premium, even with another design, would not incentivize people. • The effectiveness of monetary incentives is acknowledged. • Monetary incentives work only for certain people. • Premium is a good instrument to stimulate savings and customer loyalty. • Monetary incentive dependent on the income of people • The high goal might discourage people • Reward is too low to motivate people. • Premium is too low to attract attention. • Premium as a political measure. • In principle positive assessment of the idea of the premium, but companies should save. 	<p>The idea of the premium is welcomed:</p> <ul style="list-style-type: none"> • because customers are in favor of energy conservation • it could stimulate others to think about their electricity consumption • monetary incentives could stimulate other people • monetary incentives could work for stingy people <p>Problems seen with the premium:</p> <ul style="list-style-type: none"> • attractiveness of the premium is dependent on personal income • premium is too low to attract attention • the high goal is discouraging • the reward is too low <p>The premium is negatively assessed, because:</p> <ul style="list-style-type: none"> • industry not private households should save more • people are not willing to forego their luxury • consciousness for the topic is missing (premium is not effective)

3	a	iv	<ul style="list-style-type: none"> • Increase visibility • Program should be coupled with smart meters and/or energy audits • Voucher as an alternative to credit on the bill. • Increase of the premium. • Einsparbonus needs to be more visible, because bill is not completely read. • Advertise the premium with ammeters because people are not informed enough about their energy demand. • Application for the premium • Tiered model suggested • Joint leaflet with all bonuses and premiums advocated to improve visibility. • An improvement of the scheme is would be appreciated. • Tiered model not positively assessed 	<p>Recommendations to improve the premium:</p> <ul style="list-style-type: none"> • Increase generally the visibility of the premium • Couple the program with Smart Meters and or energy audits in the house of customers • Voucher as an alternative to the credit on the bill • Increase the premium (50-100€) • Increase visibility of customers who receive the premium • Exemplify the amount of savings • Advertise the premium with ammeter-lending • Introduce an application to receive the premium • Tiered model with higher premium • Lower goals • Joint leaflet with all bonuses and premiums
3	b	i	<ul style="list-style-type: none"> • Need for feedback • Need for a better overview over consumption by months. • Complain about the lack of control of the amount of energy consumption. • No personal need for feedback. But possible need for other people recognized • Feedback not needed, because knows about option to control consumption with ammeter. • No personal need for a more frequent feedback. 	<p>Customers state a need for a easy to understand feedback to control their consumption</p> <p>Customers who don't need feedback:</p> <ul style="list-style-type: none"> • are already controlling their consumption, but observe a need for other people • know about the option to measure with a ammeter • think the yearly feedback is sufficient
3	b	ii	<ul style="list-style-type: none"> • Smart Meter in home display would be welcomed 	<p>Smart Meter feedback with an in-home-display is welcomed because it makes control easier (no need to go down the cellar)</p>
3	b	iii	<ul style="list-style-type: none"> • More frequent feedback is appreciated. • Bills twice a year could increase the consciousness • Sceptic about a monthly invoice because of seasonal differences. • More frequent bill negatively assessed, because too much to read. • Monthly invoice would not change behavior. 	<p>Frequency of Feedback:</p> <ul style="list-style-type: none"> • monthly via e-mail is welcomed • bills twice a year could increase consciousness • would not change anything in the behavior • is negatively assessed, because it's too much to read • is negatively assessed because of seasonal differences (overview better)
3	b	iv	<ul style="list-style-type: none"> • Online platform would be welcomed 	<p>A web platform is positively assessed because:</p> <ul style="list-style-type: none"> • it is a comfortable option to inform oneself • the affinity of younger people to web applications

3	b	v	<ul style="list-style-type: none"> • Information on the bill is not known. • Information is welcomed. • Information on the bill could be very effective. • Information should be more visible and easier to understand • Information known and positively assessed. • Knows the information on the bill and uses it. 	<p>Customers who know the information:</p> <ul style="list-style-type: none"> • use it to control the own consumption • state that it could be very effective, because people who don't care about their consumption are startled by it • state it should be made more visible in order to be effective, for example with colorful cues on the first page of the bill <p>Customers who don't know the new information on the bill:</p> <ul style="list-style-type: none"> • appreciate it and think it's useful • state that it should be made more visible • state that the bill is too difficult to understand and too long
3	c		<ul style="list-style-type: none"> • Energy audit is useful but not visible enough. • Need for feedback through energy audits • Energy audits of the municipality should be more advertised. • Costs for consulting are rejected. • Energy audit seen as a measure of last resort. • No need for an energy audit with regard to appliances. 	<p>Energy Audits:</p> <ul style="list-style-type: none"> • could support people saving electric energy • are seen as a measure of last resort • are seen as unnecessary for appliances • are not visible enough • should be more advertised
3	d		<ul style="list-style-type: none"> • Doubts in regard to justice issues related to the progressive model • In principle appreciates a progressive tariff model but has concerns for the one penalized erroneously. • Indifferent about progressive tariff. • Progressive tariff is supported and would be effective. • Progressive tariff rejected because private households are the wrong target group. • Linear tariff for the industry • Linear/progressive model appreciated. • No justice problems are noted for the progressive model. Consumers who demand more have to pay more. • Linear model would be preferred. 	<p>Customers perception of a progressive tariff model is:</p> <ul style="list-style-type: none"> • that it is effective, but could be unjust • that it is a compulsory measure but more effective compared to the premium • that households are the wrong target group and industry should pay more • that it would be effective but disciplining/interfering with peoples private sphere • that a linear model is preferred over it because of justice issues • that they are indifferent

4	a	<ul style="list-style-type: none"> • Politicians in favor of energy conservation should play an important role • Municipal politics should influence the company. Advantage that it is controlled by municipality • Energy saving is assessed to be no policy issue as the price is high and people therefore care about it and other issues are more important. • Municipal policy positively assessed. • The municipality should do more for higher energy savings. • Municipal politics should act more. • A municipal company is preferred over the liberal market with many companies, because it can be steered. • Politics indirectly influences company. • Better coordination or joint initiative for energy audits 	<p>Municipal politics:</p> <ul style="list-style-type: none"> • should use the company and shape conditions • should steer the company • see it as an advantage that the company is owned by it • should care about other topics than energy conservation because there are more important ones • should not only address private households (streetlamps and industry mentioned) <p>is generally positively assessed by customers</p> <ul style="list-style-type: none"> • should do more for energy conservation • should improve the coordination or joint initiative for energy audits
4	b	<ul style="list-style-type: none"> • Politicians and media should speak more about the topic to make people aware • Politics should address industry and "big" consumers (streetlights, traffic lights) not private households. • It is not only the responsibility of the individuals but also the influence of industry and politics that lead them to consume more. • Mistrust in politics to change anything. 	<p>National politics:</p> <ul style="list-style-type: none"> • is negatively assessed • should address big consumers (industry) and make them save • is associated with mistrust (weakness) • should be more about energy conservation (in media) to increase consciousness for the importance

Appendix G – Analysis of the Expert interviews

	Unger	Teigeler	Spinnler
Einsparbonus / Premium	Unfortunately no. Up to now there was no bigger evaluation done on this question that is why I can't say anything about. (Which kind of households received the premium?)	Before we introduced the bonus we counted on 20% of the customers that could potentially receive the premium. I have in mind that about 15% of the customers achieved the goal. [...] Not only based on my sense but also based on the experience that you confirmed again. But we believe that not all customers will achieve the goal. We assumed that 20% of the customers will achieve the 15% conservation goal.	I have to admit that I'm not aware of my electricity consumption; I don't know my current demand. But, of course I have plug bars and I have set my computer in a way that it uses less energy and switches of when it's not use. So in this respect I'm aware, but I don't know my demand per month.
	No, I can't say anything about the magnitude of windfall gains. That would be part of the evaluation that we have to do. But I would estimate it about 10% or 20%.	Well generally,... from my point of view, which is the sales views, I would say that all this should be possible. Thank you very much for the hint (that customers did receive the premium unwittingly) of course I receive that with thanks that it's too invisible. And it helps nobody if there is a present that is not well presented. [...] Now we have to think about how to change the process. If you change the logic of the billing that is first of all an effort. When I introduced this product there was an office grapevine, a small anecdote, among the IT employees and the service providers, saying that it isn't a climate premium but a catastrophe, because it was difficult for them to integrate it into the bill.	No I don't know the premium.

	<p>No, it's difficult to ensure that (that the reduction is sustainable). It would be a big effort that we partly already do. We already check every case and assess it whether it is realistic or not. We also ask how the reduction was achieved. But I can't say how many percent it is.</p>	<p>Technically everything is possible, but you start to increase the expenses. To pay the customers 15€ the expense behind is then perhaps 50€.</p>	<p>I'm not in the board of the utility company. But I have KlimaFix, but I didn't care too much about it. It's likely that I just skimmed over and that's probably why I didn't notice. But I think it could be an incentive for some people. But I think that it should imply that it is offered to customer that they are informed about their consumption level quarterly. That also fosters the incentive to save like "oh I have saved, so I go on doing it". That would improve this campaign compared to the current system when they are informed at the end of the year and see "oh my god, I did not reach the goal". That would be my proposal.</p>
	<p>Yes, there were some households, which received the premium twice or even three times. Perhaps 150 or 170 of the 850 cases in total. And I believe them. I think it is possible to do that.</p>	<p>There are also customers, who say that they take the KlimaFix because of the renewable energy, but who did not read about what is special in this tariff: the two boni. The first one is supporting local climate mitigation projects and the second one is for energy conservation. Some presumably aren't aware of that.</p>	<p>Perhaps it is also caused by too little advertisement in the regional newspaper. That they don't place it in the newspaper so that it is clearly visible. And the page of the utility company in the local weekly newspaper is perhaps not sufficient, because it is perhaps too boring for many people.</p>
	<p>Yes, we thought about changes, because we have still some budget and the prices for electricity increased too. At the moment we pay 10 ct per kWh, which is about 40% of the electricity price. So we thought about increasing the premium, but in this case we need to ensure more the sustainability of the reduction.</p>	<p>It's not about the money. It's not about the 15€ that the customer receives, but 15€ plus the amount of energy saved and that is the important part. Perhaps this fact has to be emphasized more in the advertisement. The 15€ is just the icing on the cake.</p>	<p>In Kiel they had a campaign called "Stromabwärts" with a price for all who participated and reached the goal of savings. Then lots were drawn and the winner received a cruise on the Rhine. I think that was ingeniously.</p>

	<p>I doubt that with an income at the normal level could be associated with a rebound effect. Perhaps on the macro-economic level, if you say ok the citizens have so much money more by saving energy.</p> <p>[..] And when we assume a satisfied level of endowments in households, almost all households have a level of endowments of about 90% or more, I don't know in what else they should invest. Perhaps the money goes to leisure activities, but these are macro-economic effects.</p>	<p>We highly cherish our customers, who took this product. They have thought about it and consciously decided to take our product. An innovative and sustainable product in our view.</p>	<p>I think you could make more out of it than just this "save 15%". That is difficult to reach I think and then you receive just 15€.</p>
	<p>Well we notice this discussion. But in principle we can't influence it (rebound effect). We had a joint project proposal with the climate alliance where we aimed at bypassing the rebound effect end transfer the savings. We developed a model, it was a theoretical model. When the household saves electricity it gets a certain value in return by the municipality such as an energy audit for free or it gets the amount of savings not paid in money but in a local currency. And this local currency can then be invested in sustainable businesses, for example an organic food store where you can purchase goods with this local currency.</p>	<p>Although nobody does that (make a draft on an energy audit). That's possibly the same case as for the bonus, they briefly are aware of it, think it is good, but then they say "well...". But for all of that, it's ok, they thought about it, done!</p>	<p>I think, they would need to review whether it's reasonable at all. It is any just about peanuts, these 15%, even if everyone would participate. I would say that it is more important to think about how to convince also the people that are not that environmentally conscious to take KlimaFix or another renewable energy electricity tariff of the utility company.</p>

	<p>This was approved by a high percentage (that Frankfurt is capital of zero emission houses), but for the premium it was only 13%, what is not bad at all but it is expandable. The interesting point was in regard to the electricity conservation consultancy. "Do you know the offer of a free electricity conservation consultancy of the city of Frankfurt?" 60% said they know it and we asked ourselves how that could be, because there is not such an offer.</p>	<p>You say it's too much. I think your proposal to use another communication channel is good, because the people are already swamped by the bill. If we put it on the first page they do not notice it. So we use another channel saying: "Congratulations, look on your bill, it's unfortunately on page 3 but your received a bonus and your saving measures resulted that you saved this amount and that means that you saved in total 100€". That would be the best solution. For the process, the accountings would say, a second catastrophe.</p>	
		<p>As we have a broad spectrum of customers it is difficult to decide which communication channel should be used.</p>	
		<p>There was a role model. The role model was the product of "EnergieGut". I was involved in the product design at that time. I was working for Trianel and had this idea always in my mind. I changed it now somewhat. In the case of „EnergieGut" there is not only one premium but it is tiered. But if I told the accountants what we do not just do one bonus but a tiered one, they would have killed me.</p>	
		<p>That is why I simplified it and said the tiered model is not interesting to anyone we just do one bonus. And as you said just this bonus is already difficult to communicate. That is why we said that it is too complex and we just do the 15€ for 15% conservation, simple and sober.</p>	
		<p>And the second point is the regional tie. "EnergieGut" doesn't have that, because it's a nationwide product. That is why we introduced the "Klimabonus" to support</p>	

		the local climate mitigation projects.	
	Unger	Teigeler	Spinnler
Political Framework Conditions	Utility companies were also there (at the workshop). But I think it is questionable whether it could be their task (to make citizens save energy).	But I say the cost structures in the power supply sector are not all dependent on the amount sold. In contrast, more and more costs are fixed and so I have to look from the management side whether I can map my cost structure on the prices.	When I read it now. I just skimmed over it again. There are so many ideas in it. We should invite him. I will talk about that with the other party members.
	I think the responsibilities have to be clearly defined. It is possible to enforce that and I think municipalities could do more, but they are still intensely dealing with themselves.	If you take away the risk from the power suppliers to sell less, then there is no problem for them. You can do that by investigating the cost- and profit structure and by doing so you will find out that the bigger part are fixed costs.	The utility company is obliged to make its contribution. [...] they are also part of this climate mitigation, 25% saving... The city voted for it. And now they have to search for options how to reach the goal.
	The inclusion of measures for energy conservation in the budgets of municipalities came up with the development and design of climate mitigation concepts.	So you have to give the utility companies the chance to defray the fixed costs by the customers paying these. This is the flat price or an increased flat price.	I could imagine, so we also have the public swimming pools as part of the utility company. In the municipal council we are not being well informed about what is going on there. And we barely can exert influence on it.
	It would be reasonable if sets of measures or project approaches would be more transferred and less imposed from higher levels to lower levels. But they should stay at the level where they make sense and that is our level, the municipalities, although they are different to each other.	By doing so I'm not longer dependent on the kWh that is sold, because the profit for each kWh is small anyway. By the way, it's like that.	I wrote a proposal, we can make proposals for items on the agenda in the municipal council. The administration then has to deal with it, because we are not informed about the public pools even in the sport committee.
	But the really effective measures are the ones that were also presented today. That is the consulting, which already works, but it would be desirable to consolidate and check whether it is reasonable that there are the consumer consulting centers and besides these other projects are	That means, that the power suppliers could free itself from the management fear or it could be freed. But for that the legislative framework conditions need to be adjusted, the customers have to agree and also the competitors would have to adopt it. In principle all would have to understand and carry it out in parallel.	The board is better informed about it. They receive a report.

	established and another one, that are all financed by different budgets of different ministries.		
	The municipalities would need to agree with the local actors, the provinces would check how they could support the municipalities, as it is to some extent already. And the national level could also check and watch for the EU goals to be fulfilled.	For us the premium is a starting point in this direction. For the company it would be better if the framework conditions were there, but we say we do this step ahead.	And this was actually an item on the agenda, which was discussed in three committees and they (the utility company) had printed a marketing concept and integrated the employees. That was really well done. That means, we could make a proposal for an item on the agenda and make them reporting us about it. For example about an improved campaign to save electricity or save energy. They shall report and present a concept just on this issue. We could do that in the municipal council.
	I would say it is driven by individuals. You need the right person at the right time at the right place. And as we have already a good position in this realm and also have good standing with politics, it was tried to push it forward with these concepts and then also place the idea respectively and force it through.	No, perhaps there are discussions about a linear tariff but not more in the municipal council.	Apart from that we could give instructions or through our members of the board of the utility company, we could say: do something about it. But, of course that is restricted. We can just offer services and publicize it. It would have to be kind of a campaign and that's not the strength of the utility company. If you have a mayor who is devoted to it, then more could be achieved. He is chairman of the board of the utility company, so he could do more about it.
	I mean Frankfurt is at the forefront, but there is still a lot to do. Just the aims of the efficiency directive. We also don't achieve the 3% and we have a big budget. But that goal was achieved in the year with the big investment program of the national government in 2010. In	The kWh costs somewhat, but for the profit of the company it could be done in a way that it's not that important anymore.	Yes a title for such a citywide campaign would be needed. When I read the book at that time, we thought about initiating such a campaign with the social democrats. But there were too less engaged people, who would have devoted their time to it. [...] It's not that easy to organize such a new

	that year was done a lot. But apart from that...		campaign. Joint forces and motivation is needed for it. It is just difficult to start such a campaign in Heidelberg. You need people like Boris Palmer, when is passionate for it and always wears his blue suit.
		Yes there are other structures in other countries. It is because of the structure of the network charge and that is changing at the moment in Germany. Because the main part of fixed costs is for the network.	I think of the example that the minister of transport in Baden-Wuerttemberg wanted to promote the bicycle to be the main means of transport. He said: municipalities can apply for becoming a biking-friendly municipality. And some municipalities applied and that improved things. [...] Now the administration just introduces measures independently and says that we want to become a biking-friendly city. That has greatly improved it. That could be done in the same way for the case of saving electricity depending on the size of the cities.
	Unger	Teigeler	Spinnler
Other Options for Intervention	(Energy audits) Yes that's quaint. That's our biggest problem. The demand for these services is below the level on which it could be demanded. And i think it is the same for all. Almost all that work in this area could tell you that. When we do a mailout on the neighborhood level we have feedback ratios of 1 %. That is the same for the premium.	Yes, Smart-Meter. No we do not just have a pilot project. Every customer can buy a smart meter and there is the Klima-product, Klimasmart, and with that you also buy a smart meter, of course also the costs for the device. [...] I recommend the decision for the Klimasmart product.	I think that the utility company perhaps tries to convince formerly lost customers to take their tariff, and they really should try to do so. The Klimabonus is a measure to regain customers. But also BUND and Nabu should publicly state that the utility company can be recommended and that they also have the tariff. The utility company is in rough competition and I think we have to think a bit local.

	<p>This was approved by a high percentage (that Frankfurt is capital of zero emission houses), but for the premium it was only 13%, what is not bad at all but it is expandable. The interesting point was in regard to the electricity conservation consultancy. "Do you know the offer of a free electricity conservation consultancy of the city of Frankfurt?" 60% said they know it and we asked ourselves how that could be, because there is not such an offer.</p>	<p>We are currently training our employees also to search the contact with customers more actively for the energy consultancy.</p>	<p>This activity in Tübingen I think is really good. They come to your house to meter the appliances or particularly the refrigerator and then they can tell you: ok, we exchange it and finance in advance the new one and with the costs you save you pay it back. It works like that: when they come to your house to read the meter they also offer to you that they measure the appliances. I think that is a good idea. I would also like them to do that here in Heidelberg.</p>
	<p>We already did that in Frankfurt. We announced a search for climate ambassadors. When I joined the administration it was already fading. The problem was: All got an energy audit and were also equipped and the idea was that they go to others and do an audit. But that failed in practice. I can't expect a private person to do a professional audit to another household. That is really difficult.</p>	<p>It's a pilot function in the background. If there is a person coming into the Energieladen and says he is interested in the insulation of his house, and then the employee tells him in the ideal case, that he is not trained to do that but that he should go to the KliBa.</p>	<p>I can just imagine that it is about the costs, that the national politicians say it's too expensive. I think it would be a good idea of the utility company to offer that when reading the meter. Because if the customer has to inform him/herself and become active it is more difficult compared to an employee coming to you and offering it.</p>
	<p>There were further projects, such as Energy-Neighborhood. [...] And when they did the evaluation they found out that a large share of the participants were university graduates, who are enthusiastic about such things and think it is interesting. But the "normal" population was not represented.</p>	<p>So you need in principle a manual to read the bill. That is basically the problem that the bill was enlarged by the legislative measures and everything that came on top was then added at the end of the bill. On the second page the legislative requirements start. You have to advice the government to change that.</p>	<p>I am a member of "Obdach e.V." It's an association that offers flats to former homeless people. [...] For example there is a team of workers that repairs and renovates the flats and there is one who is a trained energy consultant. He comes to the flats and measures the demand. [...] He comes in the flat on demand and has good outcomes. Perhaps it is because he speaks the "same language" as the people living there because it is not an expert who is coming. We are proud of him and he got invited by the utility company.</p>

	<p>I could imagine that for the e-club, that it is combined with a touting component. But we said first we build a basic set of tools and these we offer to the participants, they have to be defined and checked, which we can only do in practice. But we see it as a module and this modular structure can be complemented.</p>	<p>Although nobody does that (make a draft on an energy audit). That's possibly the same case as for the bonus, they briefly are aware of it, think it is good, but then they say "well...". But for all of that, it's ok, they thought about it, done!</p>	<p>That would be an option, that you could check it quarterly. In the best case online with a login to a customer's account where you can also see the past levels. Then I would know my consumption level. Then I can notice perhaps even: Oh I bought a new television and that made a difference. Because I don't read the meter. But I would be interested in it to check from time to time. And when you start, it is likely that you do it again and again and then it becomes a habit. I could initiate that. I would even go to the utility company to talk with them about that. They surely have the demand levels.</p>
	<p>But we have the opinion that there is still potential for a lot of households. And if it's just such a banal advice as "do you really need a dryer, you have such a big balcony"? But it is hard to quantify that.</p>		<p>We had that in the past such a campaign "energy saver of the year" but that was years ago. I know one who got that, he almost doesn't consume at all. [...] But I think it is not the best idea. I think there are not people who would participate. If it were linked with a premium or a reward I could imagine that it would work well.</p>
	<p>Our audit takes 2-4 hours depending on the size of the household. When we can't find anything that could be done on the product level, then it's still the best option to be aware for these things.</p>		<p>I think monetary incentives are a kind of an adjusting screw, with which some things could be achieved. I don't react to such incentives but I know people who would do that. But they would need the option to control their demand.</p>
	<p>I think that is also the problem, that the problem is too banal for many people, because it is too easy, that is the basic problem. With regard to the paper, that accrues, there is the bin and you can throw it into it. That's it. But for the electricity demand it's different. I think there is no effective</p>		<p>Well with regard to the refrigerators there could be a ban, so that there are just class A ones left. So that it would be similar to the heaters that they slowly disappear from the market. Or the social welfare office could only finance energy efficient appliances.</p>

	mechanism with which it can be imposed. I think it can just be done with the respective sensitizing.		
	We reversed this progressive tariff with our premium. But the people don't get it. That's abstruse. For the typical average customer it is way too abstract.		Yes that is right, you would also have the others valued. With the average values that should be introduced. Perhaps it can't be said so directly, perhaps that only the information and a curve are given. You don't need the smiley and perhaps the citizen gets it, if he is interested.
	That is a model, these progressive tariffs, that shows the causal links and the behavioral costs that are behind. That is a way how to do it. But it probably is just caused by rising prices that the people think about it, at least a part of them. Or that it is designed in that way. That's doable. But the belief, that it's enough with tips on homepages and leaflets, it's just not working. Nobody reads that.		
	But that is just one option. Another one is to work with social pressure. And there are such projects for example with families. The energy efficient family, where the whole family is involved and not just the responsible person, but also the kids. You could also have an energy caretaker in the family. And often it is like that, that kids have other priorities and then they are kind of a caretaker. And that also works.		