



How firms can use psychology to create successful energy conservation interventions

A literature review

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Working Paper

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Off4Firms

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Off4Firms in a Nutshell

Off4Firms – Employer-led incentives for households' reductions in CO₂ emissions and energy consumption

Off4Firms is an applied research and innovation project aiming at reducing greenhouse gas emissions and energy consumption of private households. The project is led by ETH Zurich (Chair of Economics, Prof. Renate Schubert) and involves project partners from academia and business: Wageningen University, South Pole Carbon, Swiss Re, and EWZ. Partially financed by EIT Climate-KIC, the project runs from April 2012 until March 2014.

Being one of the world's largest emitters, households in aggregate bear an enormous potential for reducing emissions and energy consumption. Off4Firms starts from the premise that one effective way of triggering change in households is through household members' employers. Off4Firms creates a win-win situation for households and firms: both profit from employees saving energy and reducing CO₂ in their households. Employees benefit because they change their energy-related behaviour with the support of their employer. This change pays for – for example through lower energy costs. Companies, on the other hand, benefit from reputation gains as employers and in the public. In addition, under specific conditions – they may profit from offsetting their emissions by their employees' emission reductions.

Off4Firms develops a comprehensive programme for firms to use this great potential in an efficient way. This project enables firms to evaluate measures aiming at reductions in energy use and CO₂ emissions in their employees' private lives. Evaluation criteria are the effectiveness, cost efficiency, verifiability and acceptability of measures for the employees. Best practice measures will be identified and a tool kit will be provided, enabling the development of company-tailored CO₂ or energy reduction measures. These measures will be brought to scale by a dedicated business unit. In addition, the policy framework making such measures a win-win strategy for households and for firms will be depicted.

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Abstract

Any solution to rising levels of CO₂ in the atmosphere critically depends on decreasing levels of energy consumption and increasing sustainable small-scale energy production in households. These may be achieved in two major ways: by changing people's behaviour and by the adoption of technology. In the fields of psychology, decision-making and behavioural economics, many factors have been identified that can influence whether such changes occur. Off4firms is an innovative project that aims at reducing greenhouse gas emissions and energy consumption of private households through interventions by firms. With these interventions, firms try to reduce the use of energy in the private households of their employees.

The first aim of this working paper is to give an overview of relevant factors and specify how they relate to energy conservation efforts. We describe the most important findings concerning psychological variables that play a role in energy conservation decisions and energy behaviour. We give an overview of this large literature, and describe six broad categories of variables:

1. The problematic psychological effects of economic incentives
2. Effects of uncertainty and lack of knowledge
3. Effects of temporal trade-offs
4. Effects of the social environment
5. Individual trait measures
6. Demographics

The second aim of this working paper is to argue that a firm-based approach is ideal for countering the negative effects and making optimal use of positive effects of these factors for stimulating energy conservation in employees' households. For every category of psychological factors we therefore discuss how these may be exploited by firms to minimize their negative effects and emphasize their positive effects. We conclude that firms offer a suitable environment in which to implement such measures, since many of these variables can be exploited to the benefit of energy conservation programs for households.

1. Introduction

Households' energy consumption and its inherent CO₂ emissions are major causes for global climate change (Levine et al., 2007; Niederberger & Spalding-Fecher, 2006). Any solution to rising levels of CO₂ in the atmosphere critically depends on decreasing levels of energy consumption and increasing sustainable energy production. These may be achieved in two major ways: by changing people's behaviour so they use less energy (also known as curtailment-related change) and the adoption of technology (or efficiency-related change; see Barr et al., 2005; Gardner & Stern, 2008). In the fields of psychology, decision-making and behavioural economics, many variables have been identified that can influence whether such changes occur. The first aim of this working paper is to give an overview of these factors and specify how they relate to energy conservation efforts. The second aim is to argue that a firm-based approach is suitable for bringing about such change. Until now, most efforts to bring about these changes have been either driven by governments, in the form of regulation, information campaigns and subsidies, by special-interest groups (such as pro-environmental NGOs like Greenpeace or WWF), or from the bottom up, by groups of individuals who join forces to make changes (for instance cooperatives that spring up to invest in the building of a privately owned windmill park). Although these actions can be quite successful, they are hindered by several issues.

First, governments (especially the European and national governments) have difficulty reaching individual citizens. There is a great deal of negative sentiment towards governmental interventions (especially regulation) and much distrust of the unpredictable nature of political decisions (for instance with regard to subsidies).

Secondly, most of these interventions only reach those individuals that have a positive attitude towards such change: people who do not care about the environment are unlikely to pay attention to information in favour of energy conservation, and will not be interested in what environmental NGOs have to say. Perversely, it is exactly this group that is important to reach, since pro-environmental individuals will take some action no matter what.

Thirdly, these initiatives are frequently scattered and not very broadly coordinated. The closer the change-agent is to the individuals (for instance local governments, clubs, etc.), the more likely it is a small organization with only a limited reach.

We propose a new approach in which firms play a central role in reaching individual citizens and helping them conserve more energy. Firms could be suitable agents for such an undertaking, as they suffer less from the three issues outlined above:

1. The distance between employees and their employers is generally small. People are in contact with their work on a daily basis, and for most people work is a large and important part of their daily schedule.
2. Since a large proportion of the population has some form of employment, firms are able to reach people in all layers of society, and with a broad range of attitudes toward energy conservation.
3. Large firms often operate on an international or even global level. Thus, many incentive schemes could be scaled up globally. In other words, the companies could exploit economies of scale in stimulating energy conservation. How this may be done is described in Policy Paper D3.1 (Gerigk et al., 2012).

On top of these structural advantages, and more importantly for the current paper, many of the psychological mechanisms that play a (detrimental) role in energy conserving investment decisions can be countered or are less prevalent in a work setting. Some positive factors can be easily utilized in a firm setting. Below, we will discuss these psychological factors and will argue why firms offer a suitable environment to avoid some of the barriers and leverage some of the positive influences on green investment behaviour.

Although the focus of this working paper is on the psychological aspects of energy conservation initiatives, we do see this as only one part of the puzzle. Subsidies, certification, etc. as described in other Off4Firms working papers (Gerigk et al., 2012; Manser et al., 2012) are also necessary parts of the type of approach we propose. With this working paper it will be possible to take into account these psychological factors to improve any intervention.

2. Psychological factors

In the Off4Firms working paper D1.3 (Gerigk et al., 2012), the focus is mostly on interventions of a financial economic nature, such as CO₂ credits and subsidies. Of course other motivations besides financial incentives are of importance for people's decisions to invest in energy conserving measures as described here. The assumption that people base their decisions solely on rational economic cost-benefit analysis is flawed for two broad categories of reasons:

1. People frequently do not base their decisions on rational deliberation, but use heuristics and are prone to biases that deviate from what rational theories would predict (see e.g., Kahneman, 2003; Weber & Johnson, 2009; Antonides 2008).
2. People do not only take into account the financial consequences of decisions, but also consider other types of outcomes, such as hedonic (will the decision lead to discomfort?) and normative (what will others think?) outcomes.

Both types of reasons for not behaving like rational economic agents have been extensively researched by behavioural economists, social psychologists, and decision scientists. In many facets, the current account is closely related to the implementation barriers described in section 2.4 of the Off4Firms working paper by Manser et al. (2012). Below I will give an overview of these factors, and explain why and how investment in energy conserving measures may be influenced by these factors.

These psychological factors can be grouped into 6 categories:

1. Problematic psychological effects of economic incentives
2. Uncertainty and lack of knowledge
3. Temporal trade-offs
4. Psychological effects of the social environment
5. Individual trait measures
6. Demographics

Below we will explain these psychological factors, and show how a firm setting can moderate the effects in such a way that energy conservation interventions can be set up more effectively through the use of this knowledge.

2.1. Problematic psychological effects of economic incentives

2.1.1. Crowding out

Interventions that focus on changing behaviour and investment decisions in the environmental domain traditionally focus on monetary rewards to encourage energy conservation (Abrahamse et al., 2005). Indeed, policymakers seem to prefer an economic cost-benefit analysis approach to energy conservation.

Indeed, there are examples abound of monetary incentives as very successful drivers of changes in environmental behaviour (Abrahamse et al., 2005; Stern, 1999). For example, Bashir et al. (2011) showed positive effects of monetary incentives. They compared Canadian immigrants with a strong focus on the financial aspect of energy conservation to non-immigrants who were relatively less materialistically motivated to engage in pro-environmental behaviours. For immigrants, highlighting the financial aspect of pro-environmental messages had a positive effect on pro-environmental behaviours. Many other examples can be given of successful financial stimulation of energy conservation, such as large programs for subsidizing solar panels, reduced road tax for energy efficient cars, etc.

However, such financial incentives often have side effects that can diminish efficacy (Ariely et al., 2009; Bowles, 2008; Fehr & Falk, 2002). Monetary incentives may “crowd out” and replace other motivations (Frey and Jegen, 2001; Deci et al., 1999), such as ethical or moral goals. This is particularly problematic when cost-benefit analyses favour the wrong behaviour, as is often the case with energy conservation at the individual or household level, where small amounts of money are at stake. To illustrate, compare the social request “Please recycle paper” to the monetarily-incentivized request “Please recycle paper, for every 10 kilos recycled you will receive a euro”. From an economic perspective, one euro is better than no money, and recycling should be more likely given the second request. However, the monetary reward changes the request from a social/normative request to an economic trade-off, and one euro may seem insufficient to justify the effort required to recycle. Thus, the addition of the monetary incentive may actually decrease the likelihood of recycling. Similarly, offering monetary incentives for energy conservation may change what was initially a moral or social issue (i.e., acting for the greater good) into an economic trade-off with small monetary gains. For investment behaviour, this means that people who make such a purely economic cost-benefit analysis will only invest if sufficient gains are likely to occur, which makes it less likely that people will invest if monetary gains are relatively small. In some cases, due to this cost-benefit analysis, people may thus be less likely to conserve energy than if no monetary incentive was offered (Handgraaf et al., 2013b). Since actual monetary gains from saving energy are not always huge, this is actually a real problem. Even a 50% reduction of a household’s electricity use leads to a reduction in the energy bill in the tens of euros per month (Vaasaett, 2012), and it is the question whether people will consider such amounts sufficient to make significant changes.

2.1.2. Norm of self-interest

Another problem with a focus on monetary incentives is that they can be interpreted as information about other people’s intrinsic motivation. People may reason that, if an economic incentive is necessary, this must be because others would not cooperate without incentives. Such inferences strengthen the Norm of Self-Interest; the belief that other people are mainly motivated by economic goals (Miller, 1999). People do not want to cooperate if they think that they are the only one cooperating (the ‘Sucker Effect’; Kerr, 1983) or if they think that the effect of their cooperation is too small to matter (the ‘Drop in Bucket Effect’; Larrick & Soll, 2008). See also section 2.4.1 Energy conservation as a social dilemma.

2.1.3. Not paying directly for energy

Moreover, many people do not pay directly for much of the energy they use. In fact, the highest levels of energy use are at the workplace (Kempton et al., 1992), where the employer pays the bill. Even at home, many renters pay a flat rent that includes energy usage. Thus, for many segments of energy consumption, monetary savings are irrelevant and a different approach to encouraging energy conservation is required. In this respect, the situation of energy conservation represents a ‘delayed social fence’, in that the costs for the individual (i.e., changing routine behaviour, investing) are immediate and salient, whereas the potential benefits (reduced energy costs, a decrease in CO₂ emissions) are distant in both time and relevance (Platt, 1973; Kollock, 1998). This constitutes a situation that is difficult to solve, because the temptation to defect (i.e., not changing behaviour) in such a social dilemma situation instead of cooperating (i.e., conserving energy) is very strong.

2.1.4. Motivation losses

Many studies that have investigated the effects of monetary incentives on energy consumption behaviour have shown that behavioural change that is achieved through such incentives frequently does not last, but diminishes over time (Abrahamse et al., 2005). In one study, Handgraaf et al. (2013b) have shown that this decline does not occur for socially incentivized energy saving. It’s important to note that although such sustained motivation is mainly important for behavioural interventions, because behavioural energy conservation relies very strongly on motivation to be sustained, it may be important even for efficiency related change. At first glance it may seem that for investment decisions such motivation is only important for

implementing the investment, and that no sustained motivation for energy saving is necessary, but it is likely that rebound effects (i.e., the increase in energy consuming behaviour that frequently occurs after installing energy efficient appliances, see the section on *licensing effect* below), as well as the likelihood that future investments will be made likely depend on keeping up the motivation to conserve energy.

2.1.5. Monitoring and privacy

Monitoring and verification and the corresponding **privacy** issues of course play an important role when reductions in energy consumption and GHG emissions achieved in employees' private households are converted into certificates. Monitoring and verification is necessary due to problems of incomplete enforcement between the employees realizing a reduction activity and the firm wanting to certify the achieved emission reductions (MacKenzie, & Ohndorf, 2012; Montero, 2001; Ohndorf, 2009). This monitoring and verification involves two major problems: it poses additional costs and it may intrude upon the employees' privacy. It is known that people are averse to monitoring and privacy issues may play a role (Steg et al., 2011). In general, employees want their privacy to be protected (Stone & Stone, 1990). In literature privacy is commonly seen as an individual's commodity that can be traded in against adequate benefits (Bolderdijk et al., 2012; Phelps et al., 2011; Posner, 1981). In the case of monetary incentive schemes, however, this again would result in additional costs. Incentive schemes based on social rewarding may be more promising in that regard, as they can be implemented at lower costs (Handgraaf et al., 2013b). Punishments, such as raising costs for employees using parking lots at the working place, are another way to encourage conservation. Although punishment may potentially be less costly (even though monitoring and administration costs would be similar), it, too, may crowd out intrinsic motivation (Mulder et al., 2006). Additionally, from a policy standpoint, punishments involve unpopular measures such as fines and might be difficult to implement.

Three questions seem to be relevant when it comes to monitoring and verification in a corporate context:

1. Who realizes the monitoring and verification?
2. Who carries the costs of it?
3. What type of monitoring and verification is employed?

According to a first Off4Firms survey among employees (N=198) of an international company, it seems that in general employees are most willing to hand on their data to a research institution, while they are less willing to hand it on either to their employer, their electricity provider, or a third party verifier. However, future studies should be performed to show whether or not this applies to all types of energy consumption related information.

The second question can *ex ante* not be answered because the answer depends on the type of incentive scheme used in the corporate program. Yet, it can be assumed that in most cases the firm realizing the corporate program would also be responsible for the monitoring and verification costs. If, however, a governmental policy scheme is directed to private households via a corporate program, a public institution or fund may also incur the costs, which would be advantageous for the firm.

The answer to the third question depends on the required monitoring and verification procedures by a regulator as well as on the corresponding privacy concerns of the employees. In general, it can be distinguished between different degrees of standardization of the applied monitoring and verification methodology. A high degree of standardization may involve the use of benchmark values to calculate achieved emission reductions (cf. section 2.1 of the working paper by Manser et al., 2012). Everything else being set equal, a higher degree of standardization results in lower privacy concerns because an increase in standardization leads to a decrease in the need for exact measurements in employees' private households.

2.1.6. How firms can exploit these psychological factors

Firms offer a good context in which to tackle these problematic outcomes of financial incentives. With regard to **crowding out** for example, the fact that people are frequently present at or at least in touch with their workplace, management and colleagues offers the possibility to reduce crowding out, for instance by regular reminders that even though there are financial benefits, money is not the only reason for conserving energy. Such reminders of the underlying normative and social benefits of conserving energy can help avoid detrimental effects of financial rewards.

Similarly, the fact that people frequently **do not pay for their energy use**, which makes financial gains irrelevant, can be countered by placing a stronger focus on social and normative benefits of energy conservation. Again, firms offer a suitable context for making people aware of these other reasons for conservation.

The inferences that people make about other people's intrinsic motivation, that it must be very low if financial incentives are necessary, and the resulting idea that others are mainly driven by financial gains, can also be countered very well in a company setting: through regular contact with others who face the same issues, people can disconfirm their suspicions about the purely selfish and financially motivated nature of other people's energy conservation efforts. By talking to colleagues and managers about their reasons for conserving energy, it is likely that employees realize that others are not in it purely for the money, but also for moral and social reasons, thus diminishing the effect of the **norm of self-interest**. This makes it less likely that people feel like they are the only one trying, which diminishes the **sucker effect**, and also makes it more likely that people realize that if they as a company all conserve energy this actually does lead to substantial GHG reductions, thus diminishing the **drop in bucket effect**.

Loss of motivation over time is also a problem that can be countered very well in a firm setting. The long-term relationship between employers and employees offers plenty of opportunities for reminders, feedback, or even competitions between employees that can help keep up motivation to conserve energy. Such feedback, when given in the right way, can be a cheap and relatively low effort way of improving energy conservation (Handgraaf et al., 2013b).

Monitoring and privacy issues of course play an important role when CO₂ reductions are to be converted into certificates. Even though it is likely that employees will dislike any loss of privacy, we have found that one way around this is to involve a reliable research institution that handles the data. Since people feel less inclined to allow companies information about their energy data, it is important that good provisions are made for reducing this problem, especially when monitoring is necessary for calculating achieved emission reductions for certification.

2.2. Effects of uncertainty and lack of knowledge

2.2.1. Change/uncertainty avoidance

One of the most important factors that influence people's investment behaviour is the general tendency of people to be *change averse*. This is likely caused by a deeper and hardwired *dislike of uncertainty* (Epstein, 1999) in general: since change involves moving from a situation which is known to one that is less well known, change by definition introduces uncertainty. One well known consequence of this is the so-called *endowment effect* (Kahneman et al., 1991): Many studies have shown that when asked to give up a good that is in one's possession (i.e., to sell), people ask a much higher price than they would themselves be willing to pay for obtaining this good, had it not been theirs. This means that for people to invest in changing their current situation (for instance by changing from a gasoline to an electric car), there is quite a high threshold that needs to be crossed before people decide to change.

2.2.2. Disjunction effect and Justifications

Another way in which uncertainty affects investment decisions is through what is called the disjunction effect (Bastardi & Shafir, 1998). According to logic, someone who prefers A over B in situation X and also prefers A over B in situation Y, should also prefer A over B when it is unknown whether situation X or Y will occur. So imagine a person who would like to install solar panels if a certain subsidy is available, but would also install them when this subsidy is not given (because she thinks that with rising energy prices it will still be profitable in the long run). The sure thing principle (Ellsberg, 1961) prescribes that even when it is unclear whether subsidies are available or not, this person should decide to invest in solar panels, since she would do it both when there is a subsidy and when there is no subsidy. Unfortunately, this is not how people reason: since people want to be able to justify (to themselves or others) why they make certain choices, they are inclined to wait for information on whether subsidies will be given, and refrain from investing until this information becomes available. Perversely, after waiting for this information (that should not affect their decision), people then give this information a disproportionately large weight in their decision, and thus may decide not to invest in the solar panels, when it turns out that subsidy is not available, even though they would have done so had there never been the possibility of receiving a subsidy in the first place.

2.2.3. Licensing

An important and well described detrimental factor in energy conservation economics is the rebound-effect (Berkhout et al., 2000): when people conserve energy, the financial savings allow them to spend money in other domains, which likely leads to more energy use (imagine a household that saves money on energy and uses these savings to buy an extra television set), thus reducing the effectiveness of any measure taken. This rebound effect is discussed in the working paper by Manser et al. (2012). Besides this economic rebound effect, there also exists a psychological equivalent. This so called licensing effect leads people to feel licensed to do something 'bad' after doing something 'good': Psychologically it feels alright to leave the lights on after changing to CFL bulbs. Khan and Dhar (2006) have shown that commitment to an altruistic act in an initial task makes people feel good about themselves and liberate consumers to subsequently choose more self-indulgent options. Thus, any energy behaviour can be affected systematically by consumers' prior actions (Dhar & Simonson, 1999; Novemsky & Dhar, 2005), thus further reducing the effectivity of any energy conservation measures or changes in behaviour (Davis, 2008).

2.2.4. Regret

An emotion that plays a role in situations that involve uncertainty about outcomes is (*anticipated*) *regret*: people who are not certain about the outcome of making an investment may anticipate feelings of regret after change. This anticipated regret may lead to *inertia*, which means that people decide to postpone their decision. Furthermore, people feel more responsible for bad outcomes that are caused by their actions than for bad outcomes that are caused by inaction (termed the *inaction effect* (Zeelenberg et al., 2002) or *omission bias* (Ritov & Baron, 1990)). Thus, if they invest in an electric vehicle that turns out to be a bad choice (for instance because of limited radius or trouble finding recharging spots), they will feel much worse about this than they would when the consequences of not changing to an electric vehicle would be adverse (for instance because fuel prices skyrocket). Since people anticipate these feelings when considering their decisions, they are less likely to change.

2.2.5. Guilt

Of course the other side of this licensing-coin also exists. Guilt can be an important driver of pro-environmental behaviour (Ferguson & Branscombe, 2010). The internal attribution of a harmful behaviour can trigger feelings of guilt (e.g., Weiner, 2000). Guilt is defined as a "painful feeling of regret that is aroused when the actor actually causes, anticipates causing, or is associated with an aversive event." (Ferguson & Stegge, 1998, p. 20).

Guilt is an important emotion in the field of pro-environmental behaviour, because it results in a felt obligation (moral norm, see par 2.4.6) to compensate for the caused damage (Baumeister et al., 1998). People who feel guilty about mankind's causal role in global warming are more inclined to take action to mitigate these detrimental effects.

2.2.6. Single action bias

Related to the licensing effect is the single action bias (Weber et al., 1997), the phenomenon that individuals are likely to rely on one action, even when it provides only a partial solution to a problem and may not be the most effective option. People often take no further action, because the first action succeeded in reducing their feeling of worry or guilt. For example, although replacing regular light bulbs by CFL bulbs is important, it is only one option in a series of changes aimed at reducing energy consumption. Switching to renewable energies, consuming less meat, home insulation, etc., are other (more) effective ways to mitigate climate change. However, if individuals and institutions participate in a project aimed at replacing light bulbs, they may be prone to the single action bias and feel like they are already doing enough to protect the environment (Center for Research on Environmental Decisions, 2009).

2.2.7. Finite pool of worry

People have a limited capacity for worrying. Scholars refer to this limited capacity as a finite pool of worry (Weber, 2006). One important consequence of this limited capacity to worry is that people can only worry about a few issues at once. Therefore, when worry increases about one type of problem, concern about other problems may diminish. In other words, people tend to pay more attention to near-term threats, which loom larger than long-term ones (Center for Research on Environmental Decisions, 2009). For example, as anxiety rose in 2008 and 2009 over the faltering economy, people realigned their list of concerns. The economy vaulted to the top of the list, while environmental issues and climate change fell to the bottom.

2.2.8. Status quo bias

All these psychological mechanisms lead to a general tendency called the *status quo bias* (Kahneman et al., 1991), which indicates a strong tendency for people to prefer the current situation over change. It should be noted that this does not always mean that people who do not invest have made a definite choice against such an investment. Many of these psychological factors merely lead to *choice deferral*, *indecision*, and *procrastination* (Anderson, 2003) which is not the same as making a definite decision against a certain investment option. Moreover, since sticking to the status quo usually means that all options remain open, this is actually a potential other reason for not investing: if a better alternative comes along, it remains an option to pick that alternative instead of the current ones. This is probably an important reason that many people are reluctant to invest in fast-developing technologies like electric vehicles and solar panels.

2.2.9. Misunderstanding and skepticism towards climate change

Even though there is an almost universal acceptance within the scientific community that climate change is occurring and that it is to a large degree man-made, studies have shown that citizens in the United States and Great Britain (Leiserowitz et al., 2006) as well as in Europe consider climate change a distant threat, of limited personal importance. Even though people may indicate that they worry about the issue, this does not necessarily lead to action. People give priority to other problems (see also the part on finite pool of worry), such as the economic crisis. Besides the fact that there is a lack of action that springs from the worry that people feel, it is interesting to see that while within the general public in Europe a large part of the population was either 'worried' or 'very worried' (62% indicated to be 'very worried' in 1992; Lorenzoni & Pidgeon, 2006), this percentage seems to be declining recently (in 2002 only 39% indicated 'very worried'). Engaging the public on this issue is thus challenging. Moreover, even when people worry, this worry does not necessary translate

into a proper understanding of the problem. Since knowledge is commonly seen as a necessary precondition for action, it is important to increase people's understanding of the issues (Frick et al., 2004).

2.2.10. Lack of urgency

People do not experience the effects of climate change directly, as the increase in temperatures is too slow for human perception, and large parts of the world are not yet strongly influenced by the indirect effects of climate change, such as sea level rise and drought. As Weber (2006) notes, the only way that people can really know about the risk of climate change is through time-delayed, abstract, and often statistical information. This type of information is much less suitable for nudging people into action than information that comes from direct experience. Thus, most people fail to be alarmed about the risk of climate change and do not take precautions. Evolution has simply not prepared us for responding to such slow and distant risks. This lack of an emotional reaction and the related feelings of urgency to the risks of climate change are important reasons why for many people the allocation of resources to reducing GHG emissions has a very low priority (Loewenstein et al., 1998).

2.2.11. Lack of knowledge on how to save energy

Even if people worry, have some understanding of climate change and want to take action, another reason that this action does not take place is that the information and knowledge required for implementing such actions is simply not available. It is frequently the case that even people who do want to reduce their energy use either do not know how best to do this, or actually have incorrect ideas on how to achieve such reduction. As an example, Gardner and Stern (2008) argue that people misunderstand the effectiveness of their actions. For example, turning off the lights when leaving a room is often suggested as a way to save energy, but it actually saves very little. Other research similarly indicates the general public has a poor understanding of the energy used in daily activities, even when they believe that climate change is real (Attari et al. 2010). Some of this is simply a lack of factual information, such as not knowing how much energy household appliances use, or how much could be saved by different types of interventions. For example, Attari et al. (2010) show that people are more likely to mention behavioural interventions (such as turning off lights, changing the setting of the thermostat) than efficiency interventions (such as insulating homes, replacing old appliances with energy friendly ones). Moreover they show that people overestimate the amount of potential savings of appliances that use relatively little energy, and strongly underestimate the potential savings for highly energy intensive appliances. It should be noted that such misunderstandings are frequently not simply a lack of attention, intelligence or finding the information, but can also be caused by the fact that the information is presented in such a way that understanding is hindered. For example, Larrick and Soll (2008) show that people believe that gasoline consumption decreases linearly rather than nonlinearly as an automobile's gas mileage (in miles per gallon) increases. Describing vehicles' fuel efficiency in terms of "gallons per 100 miles" corrected this misperception and led to more fuel-efficient choices. The authors therefore recommended that the United States switch to the latter metric. Such a lack of accurate knowledge obviously makes it difficult to make optimal decisions.

2.2.12. Implementation problems (Theory of Planned Behaviour)

The theory of planned behaviour (TPB; Ajzen, 1991) is often used in pro-environmental behaviour research. The theory successfully addresses how behavioural intention leads to (pro-environmental) behaviour (Bamberg & Moser, 2007). According to TPB, intention is a result of three factors: attitude toward the behaviour (discussed in par. 2.5.1), a subjective norm (discussed in par. 2.4.4) and perceived behavioural control. Perceived behavioural control involves the individual's confidence in her skills and resources that are required to perform the behaviour. Perceived behavioural control with regard to energy conservation to a large extent depends on information. A lack of knowledge about effective actions that can be taken to curb energy use, it is likely that people's intention to do so is low.

2.2.13. Choice overload

Although rational economic reasoning would conclude that as the number of options to choose from increases, it becomes more likely that for every preference there exists an option that fits these preferences, thus making it easier to cater to every individual's preferences, it turns out that psychologically, the picture is somewhat different. Recent research in psychology has shown that people in today's society frequently experience what is called 'choice overload', the phenomenon that the overwhelming number of options to choose from can paralyze people or cause them to make suboptimal decisions (Iyengar & Lepper, 2000; Schwartz, 2000). There are several reasons for this. First of all the large number of choices provides consumers with so much information that they are unable to remember all this information for making trade-offs between options (Fasolo et al., 2009). Secondly, to make a reasonably educated choice between all these options one has to spend a lot of time and effort for merely finding all the information and comparing all the options. People frequently do not have time or energy to invest in each of these choices (Iyengar et al., 2006). Thirdly, the sheer number of options makes it easier to end up with an option that later turns out not to be the best possible option, which leads to regret (Schwartz et al., 2002). An example is the market for green energy, where there are many different providers, each with their own pros and cons, different pricing schemes, different sources of green energy, etc. Figuring out which one to pick requires a great deal of time and effort, and it is not unlikely that after making a choice some new piece of information turns up that shows that the option picked is actually not optimal. Since people are aware of this choice overload from the first moment that they decide to switch to green energy, it is likely that many quickly decide to stick with their current provider and not spend the time and energy that is needed for making a good decision.

2.2.14. How firms can exploit these psychological factors

Firms offer a suitable environment to tackle many of the problems related to uncertainty and lack of knowledge. In organizational psychology, the stories that together make up an important part of an organization's culture are seen as one of the most important and effective ways to spread information to employees (Swap et al. 2001). This naturally occurring information exchange is ideal for spreading knowledge and reducing uncertainty about change related to energy conservation. Since examples from colleagues who have decided to make changes are available and information about their experiences can be shared within the company structure, both through formal (website, newsletter, or even workshops) and informal communication ('the grapevine'), it is possible to deal with many of the issues outlined above.

It is possible to diminish the **fear of change** and reduce the impact of **uncertainty avoidance** since the experiences of similar others within the company can take away these fears and feelings of uncertainty. This reduces the amount of potential **regret** people may fear with regard to the changes involved. Moreover, because firms have a size advantage, it may even be feasible to further reduce uncertainty by investing in one of the potential options and let the employees experience such options for themselves. This is for example already done successfully by some firms that offer electric vehicles that can be used by employees during work hours.

Having a company-wide intervention scheme available also makes it easier to tackle problems associated with the **disjunction effect**. Since introducing the type of intervention we propose means that definitive plans are in place, and backed up by the firm, uncertainty about which future situation will occur can play a much smaller role. The necessary **justifications** for making changes can come from positive experiences of co-workers, or from known financial advantages to be gained by making changes.

With regard to **licensing effects**, the context of a firm offers ways of warning people about this potential problem. Since people are usually unaware of the occurrence of such effects, learning about them can already help counter detrimental effects. Through information exchange (again this could be done both formally or informally), people can learn about this risk, and take action to minimize its effects. Similarly, people are also

unaware of single action bias. Informing them and stimulating them to do more than just one thing, can help them overcome this automatic effect. Moreover, firms can help avoid **rebound effects** by offering them opportunities to invest the money gained in other energy conservation measures, thus reversing the rebound effect into a stimulating factor.

Through the reduction of uncertainty and by informing people about such detrimental psychological phenomena, the **status quo bias** can be reduced.

Similarly, **misunderstanding and scepticism towards climate change** can be diminished by informing people about scientific knowledge about these topics. Informing people about the actual facts through workshops, dedicated webpages, etc., can help change this. Moreover, even though most people worry to some degree, this worry does not necessarily translate into action. This **lack of urgency** can be tackled within a company by a better explanation of the statistical information (both formally and informally), but also by relating this information to actual occurrences in real life, for instance by highlighting experiences of colleagues who have suffered damage related to climate change. In international companies this may be easier to do, since it is likely that some employees live in areas where climate change has had detrimental effects. As an example, it is likely that hurricane Sandy, which hit New York City in the fall of 2012, has made many people more conscious of the potential threat of sea-level rise and weather changes. Colleagues who hear about such events may change their minds about how distant these events actually are.

Another important cause of this lack of action is the **finite pool of worry**; people can only care about so many problems at once, and as other, more urgent problems take precedence in people's lives, environmental issues diminish in importance. Firms can help to keep this issue more at the forefront of people's minds. Just the fact that a company offers an extensive program to reduce energy use by its employees already signals that this must be a serious problem that requires action. Moreover, as will be discussed below, these programs offer ways to reduce the problem by doing something about it, instead of getting rid of it by simply ignoring it.

The **lack of knowledge on how to save energy** that is present in the general public can easily be tackled by offering multiple ways of doing so and giving people information about the effectivity of different changes that can be made. This will empower people to actually take measures that make a difference.

Similarly, **implementation problems** can be tackled by helping people find the right information on how to do so. It is fairly easy for companies to offer an environment (either digitally or through other means) where information about how to make changes can be stored and found by other employees. A WIKI-type environment where people can find and add information can be of great help here.

As mentioned, three of the main reasons for detrimental effects of **choice overload** are problems to remember all relevant information, time and energy needed for finding the options, and anticipated regret when the option chosen turns out to be suboptimal. All of these issues can be dealt with within a firm setting: through sharing of information, both about the potential options and others' experiences with these options, it is possible to avoid needing too much time and energy, easier to reduce the number of options and because of learning about other people's experiences it is possible to avoid regret. Moreover, by only offering those options that are relevant for specific groups, firms can play a role in limiting the number of options, thus reducing choice overload. Firms who know their employees can limit the set of option to just those that are likely to satisfy their employees' needs.

2.3. Temporal trade-offs

One of the essential issues of any environmental decision is the temporal trade-off that has to be made: investments and changes (which are costs) have to be made immediately, and benefits usually appear in the future, or even if they start immediately, are spread out over the future. The standard economic approach to assessing the value of future outcomes is to discount them, reducing their value per year of delay by something

like the prevailing financial interest rate. In contrast to the economic assumption of exponential, constant-period discounting, people tend to demand much greater premiums for delay when immediate consumption is an option than in situations where all possible outcomes lie in the future (Frederick et al., 2001; Mischel et al., 1969; Read, 2001), to discount gains more than losses and small outcomes more than large ones (Thaler, 1981), and to show greater discounting when delaying than when accelerating consumption (Loewenstein, 1988; Hardisty et al., 2012). Environmental decisions where both financial and non-financial outcomes are realized at different points in time raise additional complications: (a) discounting may be domain-dependent; Chapman (1996) for example, has shown greater time discounting for health than for money; (b) time horizons of environmental outcomes are often much larger than those typically studied with monetary outcomes; (c) in contrast to the financial scenarios typically studied, environmental outcomes generally have consequences beyond the individual decision maker; and (d) environmental outcomes are typically more uncertain than monetary outcomes. Few studies have examined inter-temporal preferences for non-monetary outcomes, and very few have explicitly studied environmental outcomes. Baron (2000) showed that people were moderately sensitive to the amount of delay in a study of discounting of environmental goods, with significantly lower discounting for longer time intervals than for shorter intervals. Guyse et al. (2002) examined preferences for temporal sequences of environmental and monetary outcomes and found that students preferred improving (as opposed to worsening) sequences for environmental outcomes, contrary to the findings for monetary outcome sequences. Examination of inter-temporal factors in resource dilemmas has shown that cooperation rates decreased with uncertainty and temporal distance (Kortenkamp & Moore, 2006).

2.3.1. How firms can exploit these psychological factors

Part of the reason for these high interest rates that people demand is the uncertainty that is inherent in dealing with the future. In addition, this uncertainty leads to hyperbolic discounting as shown by Epper & Fehr-Duda (2012). As already argued, firms can help reduce this uncertainty: within the framework of the firm it is possible to show examples of people who have made similar decisions and provide information on the outcomes over time of those decisions. This should make it more likely that people make **better temporal trade-offs**. Moreover, with regard to the impatience that is at the core of this strong preference for now over later, firms can help make the long term outcome more attractive. Subsidies significantly reduce the upfront cost, thus making it extra attractive to opt for the long-term positive outcomes (Epper, Fehr-Duda, & Schubert, 2011). This can help people over the threshold of their impatience, and make it more likely that people make the investments that rational decision theories would prescribe.

2.4. Psychological effects of the social environment

2.4.1. Energy conservation as a social dilemma

Most environmental problems can be characterized as large-scale social dilemmas, also known as large-scale prisoner's dilemmas, n-person prisoner's dilemmas, resource dilemmas or commons dilemmas (Dawes & Messick, 2000). These are situations in which there is conflict between the individual's own outcome and the outcome of the larger group: Everyone is better off if more individuals do the 'right thing', but for each individual the best outcome can always be gained by not cooperating. In the case of climate change, the structure of the social dilemma is as follows: if every individual in the world significantly restrict their energy consumption, and switch to sustainable energy generation, this would diminish CO₂ emissions to desired levels. If all cooperate, individuals face a dilemma: "if I would not restrict my energy consumption, effects on CO₂ emissions would be minimal, and my own well-being would be increased". Of course, if everyone reasons similarly, energy consumption remains high, and everyone suffers. The problem with these situations is that even though cooperation by more people always leads to higher overall outcomes, it is equally true that defection is always the strategy that yields the higher individual outcome, regardless of what others do.

Psychologically, there are many reasons why groups of individuals are frequently unable to reach optimum outcomes in these situations.

2.4.2. Self-interest (individualism)

One important reason is the obvious fact that people prefer higher outcomes for themselves: if it is the case that defecting yields a higher outcome than cooperating, no matter what others do, a rational self-interested agent should defect. Indeed, self-interest is a strong motivator for defecting in social dilemmas (Deci et al., 1999). In fact this self-interest has long been an underlying assumption in many economic theories. Recently more nuanced theories have gained influence, especially from the field of Behavioural Economics. In these theories the strict assumption that people are rational self-interested maximizing agents has been loosened (Fehr & Fischbacher, 2002). This has led to the insight that self-interest is not the only motivation that people have when they are in these types of situations. People do also care for their outcomes relative to others and even about others' outcomes per se. Many models that incorporate these ideas have sprung up recently (Bolton & Ockenfels, 2005; Loewenstein et al., 1989). It is important to note that despite these other oriented motivations that may play a role, self-interest is still a very strong motivator in social dilemmas, and may lead people to defect.

2.4.3. Norm of self interest

Another psychological phenomenon that plays an important role, especially in large-scale social dilemmas where the agents are strangers (as is frequently the case in marine conservation efforts) is the norm of self-interest (Miller, 1999). The norm of self-interest is the prevalent norm (especially in individualistic countries) that people act on self-interest. People tend to think that it is normal to behave in a self-interested manner (and thus abnormal to behave in a non-self-interested manner) and therefore find it difficult to behave in such a way that it harms their own outcomes, even if such behaviour is in line with their attitudes. As an example, even individuals who lease a car through their company and who feel that driving a very small and energy efficient car is the right thing to do, will not do so, because it is considered abnormal to not lease the most luxurious car you could have. Moreover, others respond negatively to people who undertake actions that are against their own self-interest (Herrmann et al., 2008). Just like any other norm, violating it is frowned upon. Violating the norm of self-interest thus comes with considerable psychological discomfort, which may weaken the link between attitudes and actual behaviour. Cooperating in a social dilemma where such cooperation is in contrast with direct self-interest is thus a difficult thing to do, even if agents have a positive attitude towards cooperation. This is an important point for policy makers, who frequently focus strongly on changing attitudes, rather than on how people can be enabled to overcome this barrier.

Moreover, this norm leads people to expect self-interested behaviour from others in social dilemmas. This also has detrimental effects for cooperation. First of all, such expectations undermine **trust** in others to cooperate. This lack of trust in others' cooperation makes people fear that they will be the only one who cooperates, a situation that people strongly dislike. This so-called **sucker-effect** (Kerr, 1983) is an extra reason for people with a positive attitude towards cooperating to refrain from such cooperation. Even if people are not afraid to be the only one, a low expectation of the number of co-operators can lead people to defect because they realize that the small minority that is going to cooperate will have a negligible effect on the overall outcomes of the social dilemma. This so-called **drop in bucket** effect (Larrick & Soll, 2008) leads people to give up on costly cooperation, especially in situations where they are aware that any solution to the problem will require long term cooperation by many, not just a subset, for a prolonged period.

2.4.4. Social norms

Since most people do not live in a social vacuum but are strongly influenced by their social context, the opinion of relevant others is a very important factor in many situations. In contrast to the problems of the economic

approach, the social norms approach seems to bear promise (Nolan et al., 2008). In many studies, simply telling people what other people do (providing descriptive social norms) or what is commonly approved or disapproved (providing injunctive social norms) has relatively strong and lasting positive effects on behaviour (Abrahamse et al., 2005). In addition to alerting them to what other people do, providing a descriptive social norm tells people what is 'normal'. An unintended side effect of this can be that people who perform better than the norm may decrease their effort (a boomerang effect). However, this can be overcome by adding an injunctive message indicating that the desired behaviour is approved (Schultz et al., 2007). Thus, social norms are a promising approach for incentivizing energy conservation (Handgraaf et al. 2013b).

2.4.5. Goal Framing theory

Another reason to expect that social norms will be effective is based on goal-framing theory (Lindenberg & Steg, 2007). The central idea of goal-framing theory is that people have multiple goals that lead them to act: a hedonic goal 'to feel better now,' a material goal 'to guard and improve one's resources,' and a normative goal 'to act appropriately' (Lindenberg, 2001). These goals 'frame' what people attend to, what knowledge and attitudes become cognitively most accessible, how people evaluate various aspects of situations, and which alternatives are considered. Goal-framing theory proposes that although behaviour is driven by multiple goals that act together, one goal generally dominates the framing process. Goal-framing theory postulates that, to stimulate pro-social behaviour, a normative goal frame should dominate because a normative goal frame often implies acting pro-socially, whereas material and hedonic goal frames often lead people to act in line with individual interest, which in many cases is contrary to collective interest (Lindenberg & Steg, 2007). For promoting energy conservation it thus seems important to highlight norms as drivers of change.

2.4.6. Moral and Personal norms

Researchers who view environmental behaviour primarily as caused by pro-social motivations, make use of the norm-activation model (NAM, Schwartz, 1977). The basic premise of the NAM is that moral or personal norms are direct determinants of any type of pro-social behaviour, including pro-environmental behaviour. Moral norms can be seen as feelings of moral obligations that people experience for themselves to engage in pro-social behaviour. Accordingly, many studies provide evidence that moral norms contribute to an explanation of pro-environmental behaviours like energy conservation (Black et al., 1985), recycling (Stern et al., 1995), travel mode choice (Hunecke et al., 2001), and pro-environmental buying (Thøgersen, 1999). Hines et al. (1987) found a mean correlation of $r=.33$ between a feeling of moral obligation to preserve the environment and pro-environmental behaviour.

The formation and activation of a moral norm is likely based on the interplay of cognitive, emotional, and social factors (e.g., Bierhoff, 2002): For pro-environmental behaviour the awareness of and knowledge about environmental problems are important cognitive preconditions for developing moral norms (see par 2.4.6). Causal attribution seems to be a second important cognitive process contributing to the development of moral norms, because such causal attributions can lead to feelings of guilt that can subsequently lead to action.

2.4.7. Social recognition

Performance feedback may be more effective if it is acknowledged by others, or if praise is given when positive goals are reached. Acknowledgement and praise are examples of types of social recognition that may increase intrinsic motivation when provided as information rather than as an attempt to control behaviour (Deci et al., 1999). Social recognition communicates an injunctive message; a perception of what is approved or disapproved of within a given culture (Reno et al., 1993). This may also be adopted as a standard from which people do not want to deviate, partly because social recognition may serve as a predictor of desired future rewards (e.g., by fostering a good reputation). As a result, people will engage in behaviours that receive approval and avoid behaviours that lead to disapproval (Bandura, 1997). While social approval may be valued

positively because it sometimes generates future benefits, it is believed that most people value social recognition positively (and disapproval negatively) for its own sake (Fehr & Falk, 2002). The provision of social recognition has led to success in behavioural management studies: it led to increased improvements in work performance in the fast-food industry (Peterson & Luthans, 2006) and in an operations division of a credit card company (Stajkovic & Luthans, 2001). Surprisingly, social recognition has rarely been studied in the domain of environmental behaviour. One exception is provided by (Schultz et al., 2007), who provided feedback on household energy conservation. Social recognition was given with a positively valenced emoticon (☺) or a negatively valenced emoticon (☹). People received a positive emoticon if they consumed less than the average consumption in their neighborhood and a negative emoticon if they consumed more than the average consumption of the neighborhood. Households that received a negatively valenced emoticon tried to obtain a positively valenced emoticon and therefore decreased their consumptions; households that received a positively valenced emoticon tried to maintain that emoticon by keeping their consumption levels low. Schultz et al. (2007) argued that these emoticons were effective because they improved people's compliance with what was considered appropriate and increased or maintained people's motivation to conserve. If people are sensitive to how appropriate their behaviour is, their sensitivity to appropriate action may be activated even more strongly if their behaviour is made known to relevant others. By providing public feedback, relevant others receive information about each other's behaviour. This may yield advantages that are not present when rewards are provided in a private context, as explained below.

2.4.8. Social Comparison

Social comparison theory claims that people have a fundamental desire to evaluate their opinions and abilities and that they strive to have stable, accurate appraisals of themselves (Festinger & Hutte, 1954). According to Festinger and Hutte, objective non-social criteria for self-evaluations of ability are hard to come by and, as a consequence, people often compare themselves with others to assess their abilities. Public feedback may thus give more meaning to individual scores and a thorough understanding of one's personal score may activate a desire to improve.

A field experiment by Schultz, (1999) about the effects of individual versus individual plus group feedback on curbside recycling provides some suggestive evidence for this expectation. Both feedback groups increased recycling. However, the people that also received group feedback (i.e., information about the recycling behaviour of their neighbors) continued to increase their behaviour from the intervention period to the post-intervention period, whereas behaviour change in the individual feedback condition (i.e., information about own recycling behaviour only) levelled off. Schultz explained his findings as follows: When feedback was withheld, people that had received comparison information about others' behaviour still had a standard against which to compare their behaviour, whereas people that received private feedback quickly assumed that they were no longer being watched and reverted to their original behaviour patterns. Thus, public feedback can help to establish and maintain normative behaviour after feedback is withheld, thereby producing longer lasting changes than private feedback.

2.4.9. Reciprocity and commitment

According to Whatly et al. (1999) and Cialdini (2008), we are more inclined to comply with requests from those who have done us favours in the past, and receiving a favor or a gift creates the urge to reciprocate the kindness. In fact, in evolutionary biology it has been shown that the strategy of responding to positive deeds with positive deeds and responding to negative deeds with negative deeds is a fundamental behavioural repertoire for many social species (Axelrod & Hamilton, 1981; Milinsky, 1987). Since the contribution of the firm to energy savings at home can be framed as a positive gesture by the firm, feelings of reciprocity may increase the commitment people feel to the goal of energy conservation. Cialdini (2008) recognizes the power of commitment to be one of the key tools in influencing behaviour. In his book, *Influence*, Cialdini recognizes that if a commitment is made, there is a natural tendency to behave in ways that are stubbornly consistent

with the commitment. Commitment may be a successful approach to reducing household energy consumption, especially given that long-term effects have been found in several studies (Katzev & Johnson, 1983; Pallak & Cummings, 1976). Freedman and Fraser (1966) found that individuals who had signed a petition for beautifying their region, began to view themselves as being public-spirited and began to act consistently with their newly formed image. Therefore, the commitment, or stance on the issue, became internalized and a source of personal identity. This premise can also be seen in Baca-Motes et al. (2013), when guests who had signed a commitment to reuse their towels also became more likely to turn off the lights when they left the room.

As a result, combining a specific commitment (to internalize pro environmental behaviour) with the norm of reciprocity may lead to a substantial change in energy/water saving behaviour.

2.4.10. Status/Signalling

People may lose or gain social approval, status and reputation by the choices they make. Especially in car purchases such processes are very important. In a recent article about green behaviour, Griskevicius et al. (2010) showed, for example, that in some communities people who buy a Prius do so not out of care for the environment, nor to save money, but in order to gain status. Such costly signalling (Bird & Smith, 2005) can be an important factor in purchasing decisions, especially if the products are visible. Knowledge about the social norms within a group and the visibility of the product are thus important for tailoring interventions.

2.4.11. Social and psychological distance

Although many people consider climate change a serious problem, they generally think of it in geographically and temporally distant terms. Most people do not personally experience the effects of climate change on a frequent basis to become alarmed. In a 2007 national survey in the US, respondents indicated that climate change was a “very serious threat” for “plants and animals” (52%), “people in other countries” (40%) and “people elsewhere in the United States” (30%). Interestingly, far fewer indicated it to be a “very serious threat” to “you and your family” (19%) and “your community” (18%). This shows that people perceive climate change mainly as a threat to plants and animals and people elsewhere, but do not see it as a local issue affecting themselves, their family, and their community (Center for Research on Environmental Decisions, 2009; Leiserowitz, 2007). This is of course problematic for the success of interventions aimed at reducing energy conservation for reasons other than financial ones. Moreover, people construe this problem at a highly abstract level, meaning that they mainly think of it in abstract and psychologically distant terms, not as an immediate, close and personally relevant issue (Trope & Liberman 2010). This is likely to lead to a lack of action.

2.4.12. Group decision making

Recent research indicates that groups who make decisions (as opposed to individuals on their own), are more likely to take a less self-centred perspective on the problem (Handgraaf et al 2013a). This might be a way to diminish the effect of self-interested reasoning as a cause for non-cooperation in the social dilemma that is represented by energy conservation. Additionally, groups are likely to have more and more diverse information than individuals and are therefore likely to be able to make better decisions based on a more thorough understanding of and knowledge about the problem (Milch et al., 2009).

2.4.13. How firms can exploit these psychological factors

One of the most important social contexts that people operate in is the workplace. Firms therefore offer a suitable opportunity for adapting the interventions to social norms.

The **social dilemma** aspect that is present in the decision whether or not to conserve energy is also present in many other decisions that employees take on a daily basis: if one is the only one in the company shirking their

duty, the company as a whole is hardly affected. However, if everyone reasons similarly, this will be very bad for the firm. People are probably aware of this on the company level. This extensive experience with the risk of non-cooperation at work can help employees to understand the dynamics of the energy conservation dilemma. It is likely that employees have positive experiences with the effects of cooperation as a means through which to achieve much more than individuals could. In fact, it could be argued that the usefulness of such cooperation is the basis on which any form of organization is built. We argue that firms can also function to foster cooperation in social dilemmas outside of the firm, i.e., energy conservation.

This is one reason why it is likely that people can be convinced within a firm setting that both their **individual self-interest** (by saving money) and the collective interest (by reducing GHG gas emissions) are best served by taking action to conserve energy.

When considering such action within a firm setting, it is likely that employees suffer less from the effects of the **norm of self-interest** that can reduce individuals' willingness to cooperate when the other players in the social dilemma are unknown others. Since people know from experience that many of their co-workers are likely to be cooperative and not just focused on their own individual self-interest, and moreover that some of these co-workers are more than just colleagues but friends that can be **trusted** to cooperate, individual employees are less bothered by the idea that they might be the only one or one of the few that is cooperating. This reduces the **sucker effect**, and can also reduce the **drop in bucket effect**, where people refrain from cooperating because they are afraid their own small individual contribution makes no difference: if many cooperate, this is actually useful.

Within a firm's culture, many implicit agreements exist on many different topics. For instance (sub) groups within firms share a common language (that is sometimes difficult to understand for outsiders), they share the same values, beliefs and norms about subjects like social interaction, bad vs. good behaviour, ethics, etc. (McShane & Von Glinow, 2010). Since co-workers are an important reference group, what is considered to be normal by an individual employee, is likely to at least partly depend on what is considered normal within their work environment. Such **social norms** can be important drivers of behaviour and decisions (Cialdini, 2008). Thus, if it is considered normal within a company to conserve energy, this may translate into the normative framework of individual employees. It should be noted that the **descriptive social norm**, which concerns information about what others are doing can have the side effect that if nobody is taking action, people follow this norm. It is therefore very important that the descriptive social norm is accompanied by an **injunctive social norm**, which is a norm that describes what is the desired behaviour. This injunctive norm can be communicated in many ways, both formal and informal.

If the financial contribution or the effort made in the energy conservation program is seen as a positive gesture by the firm, employees are probably inclined to behave in such a way that the company benefits. Firms are especially good contexts to make use of such **reciprocity**, since the relationship between employer and employee is in essence a reciprocal one. Thus, if it is known that the company benefits from employees who save energy at home, this may help stimulate such energy conservation. Moreover, the firm may create **commitment** to the goal of saving energy in multiple ways. In general, the existence of social norms within the company can induce commitment to the collective goal of conserving energy (Cialdini, 2008). However, this commitment can be strengthened by asking employees who take part to publicly commit themselves to energy conservation. Such public commitment can be a strong motivator for taking action, since people want to be seen as consistent by others and by themselves. Thus, if they publicly commit to certain goals, they feel obliged to behave accordingly. This process can be strengthened even further by giving **public feedback** about their goal-related progress: if some competition or general monitoring system provides employees with information about their achievements, the effect of commitment will increase further (Handgraaf et al., 2013b).

As **goal framing** theory argues that feeling good, earning money and norms are all important potential drivers of decisions and behaviour, it is important that these three point towards the same direction, instead of leading to conflicting recommendations. It is important to create interventions in which any action taken or

change made does not lead to a loss of comfort, does not lead to financial losses and is in line with social and personal norms. If a company intervention manages to align these three aspects, it is more likely that the intervention will be successful. The proposed type of interventions, especially the investment type of change, offers a suitable opportunity for such alignment, since many of the potential investments lead to more comfort, save money and are good for the environment, thus satisfying all three criteria.

These social norms may in turn influence **personal (or moral) norms** (Staats & Harland, 1995), which can make it more likely that employees take action to conserve energy, also outside of the workplace. Firms can provide a suitable context in which such pro-energy conservation norms may be stimulated. This can be done in many ways, by the management communicating that this is a core value of the company, by incentivizing energy conservation within the workplace, and of course by all the formal and informal communication media in the aforementioned sections detailing the reduction of uncertainty and increasing knowledge.

A firm setting allows for easy comparison with similar others, which makes it possible to correctly appraise one's own behaviour. It is likely that through informal communication (but again, this could be formalized as well), people learn about what similar others are doing with regard to taking action to conserve energy, what their reasons are, and how their own behaviour compares to these others. Such **social comparison** information can strongly influence an individual's intentions, since people are strongly driven by what other people in their own group do (Nolan et al., 2008).

Positive effects of these comparisons are especially likely when such comparisons are accompanied by **social recognition**, i.e. positive social feedback by other employees or the management. Again, this can be done through informal (compliments, positive remarks) or formal channels. Such formal approaches within companies have actually already been tried and found successful, with energy conservation competitions as one popular example. It should be noted that such approaches to stimulating energy conservation have to be adapted to the specific target group. As argued before, some groups are more sensitive to financial types of incentives, others are driven more by competition, and yet others mainly care about social approval. It is for instance unlikely that higher management personnel are very sensitive to relatively small financial incentives, whereas this may be different for blue collar workers. Moreover, it is likely that people with a highly positive attitude toward the environment respond less well to financial incentives, whereas competition may be a much better approach. The advantage that firms have is that they can know their employees' preferences in this respect, and are thus able to fit the intervention exactly to the target group.

If it is the case that the social and injunctive norms within the company are in favour of taking action with regard to energy conservation, this can become a strong driving force, as people may gain **status** from taking positive action. Improving their status is important to people, and as has been argued before (Griskevickius et al., 2010), 'green' behaviour is also subject to this phenomenon. Studies have shown that some people for example decide to drive a hybrid car, not because of financial reasons, nor because they are terribly concerned with the environment, but because it improves their status within their local community, where the social norm is to be 'green'. Similarly, solar panels on one's roof clearly **signal** one's pro-environmental intentions.

Within a firm setting, it is possible, as mentioned above, to make the issue of climate change a less distant issue. By relating this information to experiences of colleagues or even customers or employees in the same industry who have suffered damage related to climate change, it is possible to make people see that these are not just distant events that happen to unknown people in faraway countries (Center for Research on Environmental Decisions, 2009). This would decrease the **social distance** people feel to the problem of climate change and change the **psychological distance** from an abstract problem to a more concrete direct threat. In international companies this may be especially easy to do, since it is likely that some employees live in areas where climate change has had detrimental effects.

Since an intervention within a company will probably lead to some information exchange between employees, the decision that are being made could benefit from some of the positive features of group **decision making**:

since people talk about these decisions, and two people by definition know more than one, it is likely that decisions are based on more and better information when taken in a group setting. Moreover, if such a group setting is conducive to a less self-interested decision outcome, it is likely that collective goals, such as a better environment, play a more important role in the decision process. This would increase the uptake of measures as proposed in the interventions.

2.5. Individual trait measures

A whole subfield of psychology, sometimes known as 'personality psychology', investigates ways of measuring stable individual traits that predict behaviour. Also known as personality measures, many of these individual trait measures bear some relevance to the type of change in the environmental domain that we discuss here. As has been documented elsewhere, the huge number of measures in existence (Appelt et al., 2010; see <http://www.sjdm.org/dmidi/>) makes it impossible to list each of them and relate them to environmental decisions. However, we feel it appropriate to briefly name a few that are obviously relevant.

2.5.1. Personal norms

Personal norms (Schwartz, 1977), also known as moral norms (Harland, Staats, & Wilke, 1999), are an individual's felt obligations toward a certain behaviour. In the case of investment decisions in the environmental domain, one might think of attitudes toward caring for future generations, beliefs in the occurrence of climate change, etc. as determinants of these norms. These personal norms are important predictors of decisions and may differ between individuals, but also between groups of people. Since these personal norms may alter the effectivity of interventions to promote interventions. For example, some people who have a highly pro-environmental personal norm may not be susceptible to any monetary incentive, since money is not the reason for their pro-environmental behaviour (see e.g., Handgraaf et al., 2013b). In fact, such people may respond negatively to financial incentives for behaviour they would display out of their own accord anyway (Bowles, 2008). In contrast, people who do not have such pro-environmental personal norms will not respond to labelling as good or bad for the environment of household products. It is therefore important to know the personal norms of the target audience before starting an intervention.

2.5.2. Environmental attitudes

Eagly and Chaiken (1993, p.1), define an attitude as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour." With regard to environmental attitudes the object of one's attitude is either the natural environment itself (or some aspects of it, e.g. air quality), or the attitude object is ecological behaviour (e.g. recycling or political activism). According to Kaiser et al. (1999), such attitudes consist of three aspects, knowledge, affect and intention, which together form the attitude. Environmental attitudes can be measured in many ways; many different questionnaires exist to measure this construct. Probably most used are environmental concern (Stern & Dietz 1994) and the New Ecological Paradigm (NEP; Dunlap et al., 1992); see <http://www.sjdm.org/dmidi/>; <http://www.conpsychmeasures.com/CONPSYCHMeasures/index.html>. In a large meta-analysis, Bamberg & Moser (2007) found a mean correlation of $r=.42$ between environmental attitude and pro-environmental behaviour, thus making it a very important factor in predicting the success of interventions. Importantly, recent research has indicated that environmental attitudes can moderate the effect of interventions, which means that the same intervention may have different effects for people with different environmental attitudes. As an example, Handgraaf et al. (2013b) speculate that (small) monetary rewards that were shown to have no impact on energy conservation for people with a highly positive environmental attitude may have a positive effect on people with less positive attitudes. This moderating effect of attitudes thus makes it important to know the target group for an intervention.

2.5.3. Social Value Orientation

As argued in par. 2.4.1, any environmental problem can be seen as a social dilemma. Studies on the motivations that underlie decision-making in such situations have a long history. These motivations have been referred to by a many different names, including: social preferences, social motives, other-regarding preferences, welfare trade-off ratios, and Social Value Orientation (SVO; Murphy et al., 2011). Within the SVO framework it is assumed that people vary in their motivations or goals when evaluating different resource allocations between themselves and others. For example, an individual may try to maximize her own payoff (individualistic), maximize the difference between own and other's outcomes (competitive) or minimize the difference between own and other person's payoff (inequality averse), or maximize joint pay-offs (pro-social). It has been shown (Garling, et al., 2003) that such Social Value Orientations influence the extent to which people are willing to cooperate in the social dilemma that is the environment (Schultz, 2001).

2.5.4. Consideration of future consequences

In par. 2.3 it was outlined that people do not deal rationally with temporal trade-offs that are inherent in environmental decision-making. However, not every individual has the same level of preference for now vs. future; differences exist between individuals, with some people more and others less impatient. Several scales have been created to measure these differences (see <http://www.sjdm.org/dmidi/>). One of these measures, the Consideration of Future Consequences scale (CFC), has been linked to environmental decisions: People who score high on this measure care more about the future. Relative to low CFCs, high CFCs show stronger pro-environmental intentions, and greater involvement in pro-environmental behaviour (Joireman et al., 2001).

2.5.5. Risk attitude

As outlined in par. 2.2.1, uncertainty is an important factor in environmental decision-making. People generally dislike uncertainty and try to avoid risk. However, individual differences also exist in this domain, with some people more averse to uncertainty than others (Blais et al., 1995). As with the previous personality measures, this can influence the extent to which people are likely to make energy conservation changes. This mainly occurs through two pathways: people who are not too worried about risks may be less worried about climate change and thus do not see the environmental necessity of changing, and people who have difficulty dealing with uncertainty may be more prone to try and reduce this uncertainty by taking measures to avoid the uncertainty related to climate change. Of course another pathway is also possible: People who are easily able to deal with uncertainty are less susceptible to some of the negative effects that come with the uncertainty related to change, as described in par. 2.2.1 and 2.2.14. People who have more trouble dealing with uncertainty are more likely to prefer sticking to the status quo, by not taking action, so as to avoid the uncertainty caused by change.

2.5.6. Need for cognition

People can differ with respect to their inclination towards cognitive effort: some people are more likely to thoroughly process information than others (Cacioppo & Petty, 1982). It is likely that people who are high on need for cognition are more likely to make rational and well-deliberated decisions. This group is thus more easily influenced by convincing arguments in favour of taking action to conserve energy. People low on need for cognition are more likely to process information in a more heuristic manner, for instance by focusing not so much on the content of messages, but on whether the source of the message is reliable.

2.5.7. How firms can exploit these psychological factors

Again, firms offer a suitable environment for making use of these insights in creating successful interventions. Firms generally know their employees quite well (and if not, they have easy access to them to learn more, for

instance by running questionnaires), and are therefore able to tailor their intervention to specific (sub)groups of employees. Since such tailored interventions can be more effective (Daamen et al., 2001), this can increase the successful uptake of measures. As addressed above, it is likely that people who differ on individual traits like personal norms, environmental attitudes, and other traits, require different approaches. For example, for people who do not care much about the environment, an approach that stresses the financial gains that can be made is probably more appropriate. Alternatively, for such a group an approach that first tries to change their attitude by informing them about the issue of climate change, what scientists think about it, and how others who understand the issue respond to it may change their attitudes in such a way that they become more susceptible to the environmental argument underlying these interventions. With regard to the individual traits that have been described, these are all predictive of the success of specific approaches to the interventions that we propose: if it's known that many of the employees within the company have a pro-social value orientation intervention can be adapted in such a way that they stress the cooperative nature of the effort to reduce energy consumption. For more pro-self-type of employees, the self-interested part (that is the financial gains that can be made) could be stressed. Similarly, for people with a low score on consideration of future consequences, the fact that subsidies make it more profitable in the short term as well, can be effective to convince people to take action. People with a low risk attitude, who dislike uncertainty, can be comforted by making sure they receive information that reduces the perceived uncertainty involved in the decision. For people with different levels of need for cognition, it is possible to create messages that better fit their profile: for people high on need for cognition, messages with thorough explanations, more complex content and more abstract information is suitable, whereas for people low on need for cognition a more peripheral approach may be more effective: messages should be easily comprehensible and attractive to pay attention to.

2.6. Demographics

Generally, it is assumed that the young, female, small sized, high-income, well-educated and politically liberal households care most about energy saving (Abrahamse & Steg, 2009; Barr, 2007; Schultz et al., 1995). We will shortly explain the relationship between these variables and energy saving or energy consumption. To find a more comprehensive study on the relationship between socio-demographic variables and pro-environmental behaviour we suggest Schultz et al. (1995).

2.6.1. Income

In order to avoid confusion with respect to the effects of this variable, it helps to make a distinction between energy usage and energy saving. Households with a high income have been positively linked to energy saving behaviour (Poortinga et al., 2003; Schultz et al., 1995). These households however, use relatively more energy than low-income households and are, for example, generally not willing to reduce the time they use their cars. At the same time, high-income households are more willing to invest in energy-saving techniques, such as solar heating. So, while their budget allows them to use more energy compared to low-income families, they have more opportunities and more incentives to invest in (expensive) energy-saving measures. Similarly, families or couples are more willing to make energy-saving investments compared to singles or singular-income families as they generally have a higher on average income (Abrahamse & Steg, 2009; Poortinga et al., 2003).

2.6.2. Home ownership

Another factor that is likely to strongly influence the willingness to take action to conserve energy at the household level is home ownership (Bar et al., 2003; Black et al., 1985; Painter et al., 1983). First of all, it is more likely that home owners see the benefits of investing in measures that conserve energy, such as solar panels, insulation, and the like. This is true because they are more likely to be living at the same place for a longer period, which makes the energy savings more profitable over a longer period. Furthermore, homeowners usually have larger living spaces and more people per household, thus making the absolute gains from saving higher. Also, for homeowners, investments in their homes, both in terms of the effort and

disruption as well as the money they cost, can potentially be earned back, as they increase the value of their home. For people who rent, the story is different: they are more likely to pay rent including energy, which makes saving energy irrelevant from a financial perspective, and moreover, even if they do pay for their energy, they have to bear the cost in terms of effort and disruption, while the benefit of the increased value of the home goes to their landlord. For those people investing in energy efficient equipment that they can take with them if they move (such as refrigerators and washing machines) is more interesting. In general, it is likely that financial arguments for investing will not be very effective for this group, especially if their rent includes energy.

2.6.3. Education

Education as well as income, is found to have a positive relationship with pro-environmental behaviour. Well-educated households are assumed to be more aware of environmental issues and have more knowledge on environmentally related policies. Knowledgeable actors are subsequently assumed to show corresponding (pro-environmental) behaviour (Barr, 2007). Schultz et al. (1995), who conducted a comprehensive review on socio-demographics of households in relation to pro-environmental behaviour, conclude that studies both show a relation as well as no relation between education and environmental behaviour. They however, argue that studies that showed no relationship between the two variables used samples with high incomes, while the studies that did show a relationship were carried out more successfully. From this we can assume that education does have a positive relation to pro-environmental behaviour.

2.6.4. Age

While Barr (2007) concludes that older people tend to reduce more energy than younger people, others show a negative relationship between age and energy saving behaviour. Barr (2007) explains his finding by arguing that elderly are still affected by the economic lifestyles they adopted during World War II. Here he seems to ignore the distinction between energy usage and energy saving. While elderly are more focused on reducing the amount of energy they use, they are at the same time less willing to invest in sustainable, energy saving measures. Others, who assume a negative relationship between age and energy saving behaviour, find that younger people (below 65) think green technical measures are more acceptable investments than elderly (above 65). Elderly, on the other hand are more willing to reduce transport use, which shows that people are more willing to accept environmentally friendly measures if they do not cost them too much (Poortinga et al., 2003). Ciocirlan and Petterson (2012) try to explain why younger people show more pro-environmental behaviour than older people. They argue that (1) younger people receive greater education concerning the environment and (2) younger people believe that negative consequences from climate change will affect them in the future.

2.6.5. Gender

Some studies conclude that females are more likely to show pro-environmental behaviour than males (Barr, 2007; Ciocirlan & Petterson, 2012; Hunter et al., 2004). Others, for example, Schultz et al. (1995,) conclude that no differences exist between pro-environmental behaviour of men versus women. However, most of these studies conclude that not gender per se results (or does not result) in pro-environmental behaviour, but rather the different roles men and women play in a household. Barr (2007) explains the relationship by arguing that women are often the ones in charge of shopping and consumption habits and are therefore naturally more likely to be the ones in place to reduce energy usage. Schultz et al. (1995) come to a similar conclusion by arguing that the person in the household that takes care of recycling and consumption is the one that is perceived most pro-environmental (which traditionally are the female household members. Both Hunter, et al. (2004) and Ciocirlan and Petterson (2012) found in a number of studies that women show relatively more concern with the environment, are more likely to participate in pro-environmental behaviour, are more likely to be engaged in indoor energy reduction, show more support than men towards adaptation policies and climate mitigation and are more likely to support pro-environmental legislation. Though these studies show the

positive relationship between females and pro-environmental attitudes, both Hunter et al. (2004) and Ciocirlan and Petterson (2012) question these results. They rather state that women are not more likely to show pro-environmental behaviour compared to men when it comes to public behaviour, whereas in private behaviour, which concerns grocery shopping and indoor energy use, they are relatively more concerned with the environment than men. Assuming that women per definition are more pro-environmental, they argue, implies a rather traditional thinking of the caring and nurturing housewife that stays in house and counts all the money that comes in and goes out. In modern times, women engage in jobs and after they come home they do not just by themselves take care of the household, but rather share tasks with other household members.

Considering the points that have been discussed in this section, we would like to conclude that gender does not necessarily predict pro-environmental behaviour, but rather that the household member that takes care of shopping and other household matters is the one that will be most environmentally concerned.

2.6.6. Number of Children

Perhaps surprisingly, Diamantopoulos et al. (2003) in a meta-analysis, show that there is no effect of the number of children on environmental consciousness. Although this seems to indicate that this variable is thus of no importance for our argument, we think that in terms of changing people, having children in the household can play an important role in trying to establish change, since larger households use more energy, thus making reduction more financially attractive, and moreover, from a psychological perspective, we expect that parents are more susceptible to information about future consequences of business as usual. Also, anecdotal evidence shows that, especially in the behaviour change domain, children can play an important role in creating and maintaining motivation to conserve energy (McMakin et al., 2002).

2.6.7. Culture

It is very likely that differences between countries and their respective cultures exist on many of the variables that have been described above. One of the major cross-cultural theories, Hofstede's dimensions of culture, based on a survey of 117,000 individuals in 71 countries, indicates that cultures can be distinguished on several dimensions (Hofstede, 2001; Hofstede & McRae, 2004). Relevant to our current reasoning are

- *Uncertainty Avoidance* - the extent to which people want certainty in their lives
- *Individualism/Collectivism* - the extent to which people think in terms of their own self or in terms of the larger collective
- *Long/Short-term Orientation* - the extent to which people have and accept long-term goals.

Each dimension may play a role in the decision to take action to conserve energy. In cultures that score high on uncertainty avoidance, it requires more effort to counter the effects of uncertainty resulting from change than in cultures that score low on this dimension. Similarly, Individualism/collectivism may play a role in decisions that involve a trade-off between individual self-interest and group interest. Individuals in cultures high on individualism are likely to respond better to an appeal to employees' own outcomes (maybe in terms of saving money), whereas cultures high on collectivism, a focus on social goals and collective outcomes is more effective. Long/short-term orientation will play an obvious role in the types of decisions that involve inter-temporal discounting where trade-offs between long- and short-term goals are necessary. Other differences between cultures are likely to be found in the domain of knowledge about climate change and the extent to which people accept climate change and energy conservation as important issues.

2.6.8. How firms can exploit these demographic variables

As with the individual trait measures, knowledge about these demographic variables such as **income, education, age, gender, family size, culture** and **home ownership**, can be of great help in setting up

intervention programs that fit the target group very well. As mentioned, income is a good predictor of the amount of energy that is used by a household: higher incomes generally use more energy. Thus, larger absolute gains can be achieved for this group. Also, it is known that people with different levels of income have different priorities with respect to what they do and do not want to invest in, and thus interventions can be tailored to fit the needs of the target group. Similarly, knowledge about education levels allows for tailoring of the intervention in terms of complexity of the message, but also allows for a focus in terms of financial versus moral/ethical considerations as motivation to take action. Low education groups generally have a lower environmental attitude. Thus, for this group either a focus on the financial aspects or an intervention that increases knowledge and changes the attitude in a more positive direction seems warranted. For highly educated employees it is likely that their environmental attitude is already more positive, and therefore the intervention can focus more on moral/ethical considerations. It should be noted that several of these demographic variables are strongly correlated (education and income; income and home ownership, for example), so knowledge about some of these variables allows for extrapolation to other predictors.

3. Conclusions

In the current working paper we have tried to make a case for firms as a suitable context in which to implement interventions aimed at increasing energy conservation at the household level. As argued in the introduction, governments (especially the European and national governments) have difficulty reaching their citizens. There is a great deal of negative sentiment towards governmental interventions (especially regulation) and much distrust of the erratic nature of political decisions (for instance with regard to subsidies). Firms have a much closer relationship with their employees. People are in contact with their work on a daily basis, and for most people, work is a large and important part of their daily repertoire. Thus, it may be much easier for firms to reach their employees in a meaningful way. Furthermore, for most employer-employee relationships a certain level of trust has to be present in order for the firm to function. It is this trust that we consider important for the success of such interventions aimed at increasing energy conservation.

The fact that existing interventions frequently only reach those individuals who have a positive attitude towards such change, may also be countered within a firm setting. Even people who do not care about the environment and are thus unlikely to pay attention to information in favour of energy conservation from governments or NGO's, are nevertheless likely to attend to information presented to them in a work-setting. Thus, since a large proportion of the population has some form of employment, firms are able to reach people in all layers of society, and with a broad range of attitudes toward energy conservation. Moreover, it's a problem that organizations that do manage to reach individuals, such as clubs and local governments, can only offer very local and scattered interventions. This problem does not hold for firms. Larger firms especially frequently operate on an international or even global level. Thus, many incentive schemes could be scaled up. In other words, the companies could exploit economies of scale in stimulating energy conservation. As Manser et al. (2012) argue, in Europe, less than 1% of all enterprises in non-agricultural sectors employ about 34% of all employees. Getting these large firms on board therefore would mean reaching a substantial part of all people.

Besides these advantages, firms also offer an excellent context in which to tackle many of the problematic psychological issues that play a role in decisions to take action in the environmental domain. It is known that a purely financial focus can sometimes lead to problematic psychological side-effects that make interventions less effective. One of the major challenges for any intervention aimed at energy conservation is the avoidance of such negative psychological processes, since this can severely hinder the intervention's effect. Successful interventions should probably find some way in which to use the positive effects of financial motivations for energy conservation, without invoking the adverse psychological effects that may occur. Firms offer a situation in which people have learned that cooperation can lead to very positive outcomes. In fact, this is probably the basis on which any organization is built. Moreover, the firm is the suitable context in which people have experienced that collective interest and self-interest can be aligned: the company does best if employees cooperate well, and this in turn best serves each employee's self-interest through prolonged contracts and better salaries. The work context is likely the environment in which people are most used to making trade-offs on both financial and social issues, frequently mixing the two and trading off one against the other. This environment therefore offers a good context in which to tackle these issues of crowding out, rebound effects, and the like, as described in par. 2.1.

Similarly, with regard to issues of uncertainty and lack of knowledge about both climate change and the actions that can be taken to reduce energy conservation, firms offer a suitable platform within which to reduce the negative effects of uncertainty and lack of knowledge, thus making it more likely that interventions aimed at household energy conservation are successful.

The interventions we propose here have the potential to greatly reduce the adverse effects of the temporal trade-offs that individuals often make. Firms offer a reliable environment in which both the uncertainty inherent to long term decisions, as well as the problem of high upfront costs for investments in long-term energy conservation can be tackled. The sharing of experiences by employees who have already taken steps to

conserve energy can reduce the uncertainty with regard to potential outcomes of investing (both in terms of the hassle of investing as well as the final yields of such investments). Moreover, the subsidies that firms can offer will reduce such upfront costs, thus making it more attractive for employees to invest.

The social environment offered by a firm, in which employees are embedded on a day-to-day basis and that usually make up a substantial part of an individual's social life, can be of great use to make interventions as proposed very effective. Social norms, the exchange of information and the general feeling of acting as a group rather than as an individual can all help to increase the uptake of energy conservation measures.

As described, individuals differ in many respects and will therefore respond differently to interventions. The firm's knowledge of their employees, in terms of demographics, but also potentially in terms of their individual traits (that can be measured), allows for the tailoring of interventions to specific subgroups to make the interventions more likely to fit the employees' profile. This will increase the success of the interventions (Daamen et al., 2001).

It should be noted that for these psychological factors to work optimally in favour of the intervention schemes, it is very important to think them through very well. Frequently, intervention programs try to incorporate some of these factors, but fail to take all of them into account. This leads to interventions that make good use of one psychological factor, only to be hampered by other factors that were not taken into account. As an example, many initiatives use competitions to motivate people to conserve energy. This in itself is a good idea because it can increase commitment to the goal and allows for public social comparisons, both factors that likely improve the success of the intervention. However, if this is done without taking into account other psychological factors, such as the potential crowding out of intrinsic motivation to conserve energy, the intervention can actually result in lower energy conservation in the long term. When people lose their intrinsic motivation to conserve energy because they are too involved in the competitive element of the intervention, they may stop caring about energy conservation after the competition has ended, which may lead to unwanted rebound effects. Similarly, licensing effects may lead people who did well in such a competition to feel that they are allowed to lessen their effort after completion. During the competition, people may try to keep information that helps them conserve energy to themselves, because this improves their chances of winning. This is of course detrimental to the overall success of the intervention. These are just a few examples of how a fragmented approach, that is a focus on just one and not on all the other potential psychological influences can lead to disappointing results of interventions in the long run.

The current working paper can be of great use in trying to avoid such problems, by using the list of psychological factors that we have described as a checklist for interventions. Before an intervention is implemented, it would be beneficial if the idea was checked against the list to make an assessment of all potential psychological consequences of the intervention. We believe that if this is done thoroughly by experts, interventions could become much more successful.

These psychological factors are important to help Off4Firms improve the benefits of energy conservation programs for employees, their households and firms. By taking these factors into account, interventions will not only be more successful in terms of the resulting energy conservation, but can also change attitudes and increase motivation to conserve energy and strengthen the relationship between employer and employee.

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