

Do values matter? Increasing the relevancy of persuasive information on saving energy

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## Abstract

Due to the climate and energy crisis, there is an urgent need to reduce our energy consumption. Domestic energy consumption takes up a large part of the European energy consumption and can be reduced by up to 70% solely with behavioral change (IPCC, 2022). To motivate people to engage in these energy saving behaviors, informational campaigns are often used, but often ineffective. Energy saving behaviors lead to both environmental and financial benefits, which align with biospheric values and egoistic values respectively. Earlier research indicates that the persuasive of informational campaigns seems to depend on how much the message aligns with the receiving individual's values (i.e. environmental benefits and biospheric values), where the persuasive power increases as the value is more strongly endorsed. We tested our hypotheses that biospheric values and egoistic values are related to the intention to engage in ESB, that biospheric messages had more persuasive power compared to egoistic and control messages and that persuasive messages were more effective when they aligned with the receiving individual's values. Results from 473 customers from Vattenfall found support the relationship between biospheric values and the intentions to engage in energy saving behaviors. However, the other hypotheses were not supported by the data. The study was conducted during a time where saving energy was salient in the media, which likely contributed to the low persuasive power of the message conditions. Future research is necessary to asses the effectiveness of value aligned messages concerning information that is less salient in the media.

*Keywords:* Value aligned messages, biospheric values, egoistic values, energy saving behaviors, financial appeal, environmental appeal.

## Introduction

There is an urgent need for climate action. The IPCC report shows that human action is causing many sustainability crises, such as climate change. To protect ourselves, future generations and ecosystems from the severe consequences of climate change, we need to drastically lower our dependence on fossil energy sources. On top of that, due to the war in Ukraine, Europe is facing a large energy crisis. The scarcity of natural gas and the inevitable rise in energy prices. Therefore, saving energy also leads to financial benefits for households. Behavioral changes could be made to decrease the total energy consumption, for both environmental and economic benefits. According to the latest IPCC report (2022), between a 40% and 70% reduction in greenhouse gas emissions can be accomplished by lifestyle- and behavioral changes. Domestic energy consumption makes up for 25% of Europe's total energy consumption and mainly consist of heating up or cooling down houses and water (EEA, 2012). This raises the question how people can be motivated to engage in energy saving behaviors (from now: ESB), such as lowering the thermostat or shorter showers. Currently, governments are making a large effort to have people reduce their domestic energy consumption, relying heavily on the use of (informational) campaigns and financial incentives, mainly because it is cheap and relatively easy to apply on a large scale (Steg & Groot, 2019).

There are multiple motivations for people to engage in ESB (e.g. financial gain, environmental benefits, compassion for people in Ukraine). In this study we aim to answer whether people intent to engage in behaviors that have outcomes that align with their values (e.g. saving energy because they care about environmental issues). Building on that, we compare the effectiveness of both financial and environmental appeals to motivate people to engage in ESB. Additionally, we will test whether these appeals become more effective when they highlight benefits of ESB that are more in line with what is important to the individual.

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Providing information is the most widely used intervention to promote behavioral changes and has its roots in the knowledge-deficit model (Steg & Groot, 2019). The knowledge-deficit model, proposes that communication should focus on the transfer of information from experts to non-experts. Yet, research shows that while solely providing information does help with raising awareness, it often does not result in behavioral change (Staats et al., 1996). Abrahamse et al. (2007) found that information is more likely to cause behavioral change when it is designed to the characteristics of the receiving individual, thereby making it more relevant to the individual. One of these characteristics can be value orientation.

Values are described in literature as “desirable goals, varying in importance, that serve as guiding principles in people’s lives.” (Schwartz, 1992, p. 21). People are motivated to take actions that help them realize their values and avoid actions that bring them further away from their values. Values are abstract goals and are therefore applicable to a large variety of situations. In addition to that, values stay relatively stable over time. This allows emphasizing values to be applicable over longer periods of time. Individuals have different value priorities, meaning that they often endorse all values in some way, but prioritize them differently.

Steg & Groot (2019) argue that there are four key values that are related to pro-environmental behaviors (such as ESB): biospheric & altruistic values (both self-transcendence) and egoistic & hedonistic values (both self-enhancement). Biospheric and egoistic values are most relevant in the context of engaging in ESB, as these behaviors (often) result in a positive impact on the environment and a financial gain (or less financial costs). De Groot et al. (2013) reported a direct relationship between values and behavior. Therefore I hypothesize that both strong biospheric values (H1a) and egoistic values (H1b) are associated with higher intentions to engage in ESB.

The relationship between values and behavior suggest that values can be an effective tool to elicit behavioral change (De Groot, 2013). Informational cues can focus the attention to specific values, consequently increasing the saliency of these values in informational campaigns (Steg & Groot, 2009). Informational campaigns that put emphasis on the connection of behavior and the effect of its outcomes on individuals' desired goals (values) are more effective (Steg and Groot, 2019). The stronger one endorses these values, the more susceptible one is to informational cues that emphasize this connection (Bolderdijk et al. 2013). This supports the idea that informational messages become more effective when they are important to the individual and that value alignment can therefore be used to motivate people to engage in ESB.

Considering that both biospheric and egoistic values can be satisfied with the outcomes of ESB, this raises the question whether environmental and financial appeals are equally effective. Financial incentives often consist of subsidies, rebates, fines and taxes to encourage pro-environmental behavior (e.g. ESB) (Steg & Groot, 2019). Although there are studies that support the effectiveness of financial incentives to change behavior (Van Vugt, 2001), studies suggest it shifts away the focus from doing what is morally right (Lindenberg and Steg, 2007), causing financial rewards and penalties to lead to less ESB. (Gneezy and Rustichini, 2000, Heyman and Ariely 2004). Schwartz et al. (2015) compared the effectiveness of communicating financial benefits, environmental benefits and a combination of both, finding that financial benefits and a combination caused people to neglect the environmental benefits. The authors argue that people already realized the financial benefits of saving energy and therefore had little persuasive power, resulting in the financial benefits drawing the attention away from the carbon emissions that were more convincing. Also, ESB often lead to little financial benefits in the short term (Dogan et al., 2014). Consequently,

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small environmental benefits (e.g. CO<sub>2</sub> reduction) that come from ESB (e.g. showering 5 minutes, instead of 10) are more likely to be found worth the effort, because people find these benefits intrinsically meaningful. Bolderdijk et al. (2013) also found that environmental appeals were more effective compared to financial appeals. The authors contributed this to keeping a more positive self-concept when focusing on the environmental benefits rather than the financial benefits. Because financial appeals do emphasize the relationship between outcomes of behaviors and satisfying egoistic value, I assume that information containing a financial cue can improve effectiveness. However, research shows that financial appeals have complications in contrast to the use of environmental appeals. Therefore, I hypothesize that a financial appeal leads to higher intentions to engage in ESB in comparison with a neutral message (H2a), but lower compared to an environmental appeal (H2b).

As mentioned earlier, not everybody endorses all values to a similar degree (Steg & Groot, 2019). Therefore a value containing message does not have a similar persuasive effect on all receivers (Dogan et al. 2013). To increase the relevancy of value containing messages, value containing messages (e.g. financial appeal) can be tailored to groups that strongly endorse that (egoistic) value. A fundamental assumption of tailoring is that messages become more effective when the targeted value aligns with the readers values, which will be tested during this study. Van den Broek et al. (2017) found a significantly greater effect in the matched values group, compared to the mismatched values for both egoistic and biospheric values. They found that participants were less likely to save paper when the persuasive arguments were congruent with their values, both in the egoistic and biospheric condition. A study conducted by Nielsson et al. (2016) also found matching values to be effective in an attempt to increase public acceptability towards environmental policy, also for both biospheric and egoistic oriented individuals. People with egoistic values were more positive about environmental policy proposals after they read the egoistic appeals. In addition to that,

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the researchers found that both biospheric and egoistic appeals separated were evaluated more favorably compared to combined appeals, suggesting persuasive messages should only contain one targeted value. Building on these studies, I expect that persuasive messages are more effective when the targeted value is aligned with the values that the receiver strongly endorses. Therefore I hypothesize that the more importance people attach to biospheric values, the higher the effect biospheric messages have on their intentions are to engage in ESB (H3). Similarly, I hypothesize that the more importance people attach to egoistic values, the higher the effect egoistic messages have on their intentions are to engage in ESB (H4).

### **Method**

#### **Participants**

About 4000 customers from Vattenfall received an invitation to participate in our study on between the 13<sup>th</sup> and 30<sup>th</sup> of September. In total, 1376 people responded to this invitation by clicking on the web link provided in the invitation, after which 512 were allocated to the experimental study presented here<sup>1</sup>. From these participants, 26 participants did not fill in the dependent variables and were accordingly removed from the analyses. From the remaining 486 respondents, obvious mistakes in the data were corrected (e.g., i9 or “negentien” became 19 in a question asking for thermostat temperature setting) and then another 13 participants were removed for not reporting on their values or misinterpretations of the questions (i.e., reporting to set the thermostat to 60 degrees Celsius, which is impossible, and probably mistaken with boiler temperature). Accordingly, all presented and figures consider the remaining total of 473 participants, which were on average 61.4 years old ( $SD = 11.32$  years), and of which 352 identified as male, 103 as female, 1 as “other”, and 1 did not

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<sup>1</sup>Participants were randomly allocated to one of two thesis studies that were combined in one web link

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want to tell. The used methods and procedures were evaluated and approved by the Ethical Committee of the Psychology Department of the Rijksuniversiteit Groningen.

### **Design & Procedure**

An experimental design was used to test the hypotheses, consisting of four conditions (i.e., control condition, biospheric appeal condition, small egoistic appeal condition, large egoistic appeal condition; for details, see next subsection “Manipulation”). Next to the experimental conditions, biospheric and egoistic values were measured which were used as independent variables for hypotheses 1a and b, and which were used as moderator variables for hypotheses 3 and 4. The dependent variable was the intention from participants to engage in ESBs. The intentions were measured in two different ways (see subsection “manipulation”).

All participants received an email from Vattenfall in which they were asked to participate voluntarily and anonymously in environmental psychology research conducted by two students from the University of Groningen. In the email there was a button which lead to an online questionnaire (programmed in Qualtrics). Participants were first presented with information about the study, after which they could continue if they provided consent.

First, all participants had to answer eight questions on their values. The participants were then randomly put into one of the 4 different conditions that were mentioned above and were asked to read the manipulation text, after which they had to answer the questions concerning their intentions to engage in ESB, followed by some questions on their demographics. Finally, they were offered to read the debrief after which the questionnaire was closed automatically.



## Manipulation

Participants were randomly evenly assigned to one of four conditions, namely a control condition ( $N = 119$ ), biospheric condition ( $N = 116$ ), or one of two egoistic conditions ( $N = 119$  &  $N = 119$ ). In all conditions, the same introductory text was presented to respondents containing information on the need to reduce energy consumption and how this could be accomplished through ESBs (Appendix A). Whereas no further information was provided in the control condition, respondents in the experimental conditions received further information on what consequences energy reductions may have for either the environment or their own finances. Specifically, in the biospheric condition, information (environmental appeal) was added on how lowering the thermostat by 1 degree Celsius results in a 254 KG CO<sub>2</sub> emission reduction a year. In the egoistic conditions (financial appeal), information was added on lowering the thermostat by 1 degree Celsius results in a cost reduction of 86 and 254 euros, depending on the egoistic condition. Two egoistic conditions were used to explore whether larger financial benefits are related to more ESBs, which became particularly relevant due to the unfolding energy crisis as a consequence of Russia's invasion of Ukraine during which gas prices tripled. The 86 euros saving is based on gas prices from before the invasion (i.e., €0,86 per m<sup>3</sup>), whereas the 254 euros savings is based on calculations based on gas prices at the time of data collection (i.e., €2,54 per m<sup>3</sup>, July 2022).

## Measures

**Values.** Values were measured with a shortened version of the E-PVQ (Bouman, Steg & Kiers, 2018), consisting of 8 items. Each item presented a portrait of a person, for which respondents had to indicate on a 7-point Likert scale the degree to which the portrayed person was like the respondent oneself (1 *totally not like me* to 7 *totally like me*). Of these eight items, two were used to measure biospheric values, namely: "For this person it is important to feel connected with nature and respect nature" and "For this person it is important to protect

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nature and prevent environmental pollution”. The items correlated strongly with each other ( $r = .70$ ) and thus formed a reliable scale ( $M = 5.55$   $SD = 1.22$ ). Moreover, two items were used to measure egoistic values, namely: “For this person it is important to achieve status and authority” and “For this person it is important to have money and possessions”. The items showed a relatively weak correlation with each other ( $r = .48$ ) and thus did not form a reliable scale. The second egoistic value was more relevant as the ESBs would result in financial benefits, not in status and authority. Therefore only the scores on the second egoistic item were used as egoistic values in my analyses ( $M = 4.18$   $SD = 1.64$ ). The mean score for biospheric values and the one item score for egoistic values were used to calculate the Spearman’s correlation for hypotheses 1a/b and were used as moderator variables for hypotheses 3 and 4.

**Energy saving behaviors.** The intentions to engage in ESB were measured in two different ways. Firstly, by calculating the changes in thermostat temperature that participants would make based on the information they just read ( $M_{Thermostat\ changes} = -.49$  degrees Celsius  $SD_{Thermostat\ changes} = 2.41$ ). Secondly, by using 11 items to measure intentions to engage in ESB on a 7-point Likert scale (ranging from 1 *totally not planning to do this* to 7 *totally planning to do this*). These 11 items consisted of different forms of ESB that are proposed by Milieucentraal (e.g. using eco-settings, lowering thermostat at night or investing in energy efficient technologies). The Cronbach’s alpha for the 11 items was .64, showing a rather low reliability of the scale ( $M_{Intentions\ Likert-scale} = 5.49$   $SD_{Intentions\ Likert-scale} = .86$ ).

The 11 item Likert scale could be divided into different categories of ESBs. The first two items concerned thermostat use and had a correlation of  $r = .45$ . The third till seventh items concerned interactions with household appliances (e.g. washing machine) and had a Cronbach’s alpha of .59. The first till the seventh consisted of ESBs that did not require an investment and had a Cronbach’s alpha of .65. The eight till eleventh item consisted of ESBs

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that required an investment and had a Cronbach's alpha of .62. All of the categories therefore have a questionable to poor internal consistency. Therefore the overall mean ESB (Likert scale) was used in the analysis.

### Results

All analyses were done using the statistical software program SPSS. In order to test whether biospheric values (H1a) and egoistic values (H1b) are associated with intentions to engage in ESB, a bivariate Spearman's correlational analysis was performed (see Table 1). There were no significant correlations between values and thermostat temperature. However, hypothesis 1a was supported for the ESB measured with the Likert-scale, showing a significant positive correlation between biospheric and intentions to engage in ESB (Spearman's rho = .24,  $p < .001$ ). Egoistic values did not significantly correlate with the intentions to engage in ESB (Spearman's rho = .06,  $p = .191$ ).

To test how biospheric and egoistic values are together associated with ESBs, a regression analysis was performed. The results are displayed in Table 2. Biospheric values remain significant, and egoistic values remain insignificant.

Table 1

*Bivariate correlations for all independent variables and the dependent variables of ESB.*

Variable	1.	2.	3.	4
1. Thermostat settings	-			
2. Overall mean ESB (Likert scale)	-.07	-		
3. Biospheric Values	-.02	.24*	-	
4. Egoistic Values	-.02	.06	.01	-

*Note.*  $N = 473$ . \*  $p < .001$

Table 2

*Regression predicting intentions to engage in ESB (Likert-scales) from biospheric values and egoistic values.*

Variable	<i>B</i>	<i>SE (B)</i>	$\beta$	<i>Sig.</i>
Constant	4.39	0.20		
Biospheric Values	0.18	0.03	.26	<.001
Egoistic Values	0.02	0.02	.05	.29

*Note.*  $N= 473$ .

The second hypothesis was that both financial and environmental appeals lead to higher intentions to engage in ESBs compared to the control message and that environmental appeals outperform financial appeals. To test this hypothesis, first an ANOVA analysis was conducted to test whether the groups significantly differed from each other. The result for thermostat changes ( $F(3, 472) = 0.48, p= .70$ ) and ESBs measured with Likert scales ( $F(3, 472) = 0.46, p= .71$ ) were both insignificant, indicating that there were no differences between the four message conditions on both variables. Therefore, no support was found for both the second hypotheses (H2a/b).

The third hypothesis was that the more importance people attach to biospheric values, the stronger the effect from the biospheric message is. For the third hypothesis a regression analysis was performed to test whether the effect of the biospheric message condition (compared to control) on the intentions to engage in ESB depends on the biospheric values from the respondent. To test whether the message condition acted as a moderator, the interaction was computed. For these analyses only the biospheric message and control message were compared, so both egoistic message conditions were left out. The results for ESBs (Likert scale) and thermostat changes are displayed in table 3 and 4 respectively. There was no significant interaction effect, thus there was no moderation effect from the message on

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the relationship between the biospheric values and the intentions to engage in ESB. Therefore, no support was found for the third hypothesis.

Table 3

*Moderation analysis: Testing interaction effect from biospheric values and environmental appeal condition on independent variable overall mean ESBs (Likert scale)*

Variable	<i>B</i>	<i>SE (B)</i>	$\beta$	<i>Sig.</i>
Constant	4.39	0.20		
Biospheric Values	0.19	0.14	.27	.17
Environmental appeal	0.16	0.09	.30	.76
Interaction	-.02	.09	-.20	.84

*Note. IV: N= 234.*

Table 4

*Moderation analysis: Testing interaction effect from biospheric values and environmental appeal condition on independent variable thermostat settings.*

Variable	<i>B</i>	<i>SE (B)</i>	$\beta$	<i>Sig.</i>
Constant	.71	2.83		
Biospheric Values	-0.12	0.49	-.05	.80
Environmental appeal	-1.30	1.81	-.23	.47
Interaction	.18	.32	.20	.57

*Note. N= 234.*

A similar approach as by the third hypothesis was followed for the fourth hypothesis, which was that the more importance people attach to egoistic values, the stronger the effect from the egoistic message is. However, this time 4 regression analyses were conducted (two for both egoistic conditions) to test whether the effect of the egoistic message condition (compared to control) on the intentions to engage in ESB depends on the egoistic values from the respondent. In this case only the control and the relevant financial appeal conditions (254 euros or 86 euros) were selected and the biospheric and the other financial appeal condition

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were left out. The results for condition 3 (254 euros) for ESBs (Likert scale) and thermostat changes are displayed in table 5 & 6 respectively. The results for condition 4 (86 euros) for ESBs (Likert scale) and thermostat changes are displayed in table 7 & 8 respectively. There were no significant interaction effects from the messages in both conditions, thus there was no moderation effect from the message on the relationship between the egoistic values and the intentions to engage in ESB. Therefore, no support was found for the fourth hypothesis.

Table 5

*Moderation analysis: Testing interaction effect from egoistic values and financial appeal (254 euros) condition on independent variable overall mean ESBs (Likert scale).*

Variable	<i>B</i>	<i>SE (B)</i>	$\beta$	<i>Sig.</i>
Constant	5.4	0.30		
Egoistic Values	0.04	0.07	.08	.59
Financial appeal (254 euros)	0.01	0.15	.01	.98
Interaction	-.01	.03	-.08	.69

*Note. IV: N= 237.*

Table 6

*Moderation analysis: Testing interaction effect from egoistic values and financial appeal (254) condition on independent variable thermostat settings.*

Variable	<i>B</i>	<i>SE (B)</i>	$\beta$	<i>Sig.</i>
Constant	-0.32	0.90		
Egoistic Values	0.03	0.20	.02	.89
Financial appeal (254 euros)	-0.02	0.39	-.06	.95
Interaction	-.01	.09	-.11	.91

*Note. IV: N= 237.*

Table 7

*Moderation analysis: Testing interaction effect from egoistic values and financial appeal (86 euros) condition on independent variable overall mean ESBs (Likert scale).*

Variable	<i>B</i>	<i>SE (B)</i>	$\beta$	<i>Sig.</i>
Constant	5.4	0.30		
Egoistic Values	0.03	0.07	.05	.69
Financial appeal (86 euros)	-0.03	0.11	-.05	.80
Interaction	.00	.02	.01	.96

*Note. IV: N= 237.*

Table 8

*Moderation analysis: Testing interaction effect from egoistic values and financial appeal (86 euros) condition on independent variable thermostat settings.*

Variable	<i>B</i>	<i>SE (B)</i>	$\beta$	<i>Sig.</i>
Constant	-0.24	0.92		
Egoistic Values	0.02	0.20	.01	.93
Financial appeal (86 euros)	-0.11	0.33	-.06	.75
Interaction	.00	.07	.01	.98

*Note. N= 237.*

## Discussion

This study investigated whether messages are more persuasive when they better align with an individual's values. Specifically, it was hypothesized that the stronger a value is endorsed, the stronger the persuasive effect of a message that focusses on this value would be on the intentions to engage in ESB (H3 and 4). The current study found no support for these hypotheses. These hypotheses were built on the idea that, because ESB lead to financial and environmental benefits, meaning that biospheric and egoistic values are associated with ESB (H1a&b). Although support was found for that individuals with strong biospheric values were more likely to engage in ESB (H1a), no support was found for the association between

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egoistic values and the intentions to engage in ESB (H1b). No association was found between values and thermostat settings. Neither did the biospheric message outperform the egoistic and neutral message in this study, as the message conditions did not significantly differ from each other. Therefore the second hypotheses (H2a/b) were not supported.

The current study contributes to the existing evidence on the role of biospheric values in the context of ESB (Steg & Groot, 2019). However, egoistic values were not associated with ESB, even though the outcomes of ESB have financial benefits. An explanation for this could be that people think of ESB more as environmentally friendly behavior instead of behaviors that lead to positive financial outcomes.

The current study found no effect from the different message conditions, in contrast to evidence provided by De Groot & Steg (2009) suggesting that messages become more effective as they emphasize the relationship between outcomes of behavior in relation to one's values. A possible explanation for the lack of effect from the message conditions could be that the messages insufficiently emphasized the relationship between the financial and environmental benefits as a result of ESB and the people's values, despite the researchers effort to design the messages around this focus. However, the lack of effect is more likely due to the fact that people were already aware of this relationship. The study was conducted during a period where reducing energy consumption was mentioned often in the media since Europe (and also the Netherlands) was facing an energy crisis. Due to campaigns from governments, but also energy companies, the amount of persuasive messages that people received on daily basis was already very high. As a result of this, the participants could have become less sensitive to these messages as they were already well aware of the relationship between the outcomes of ESB and the values they endorse. Thus, the manipulation failed to strengthen this mental connection further.



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Another possible explanation for not finding a difference in persuasiveness between the message conditions, that relates to the previous paragraph, is that the intentions to engage in ESB were high regardless of the message condition. This is supported by the high overall mean ESB of 5.5 on a 7-point Likert-scale (in all participants), which is high considering this measurement included all forms of ESB. It possibly shows that people are already aware of the relationship between the financial and environmental benefits of ESB and their values, as it is unlikely that people indicate to intent to engage in behaviors that they do not know the outcome of. Likely, people already do what lays within their possibilities to engage in ESB. Therefore, there was not much room for the message conditions to increase the participants' intentions to engage in ESB.

**Limitations**

The study only made use of short answers and Likert-scales. Therefore we can only guess the reason behind the answers and we cannot track why the messages were not effective. This could be improved by the inclusion of open questions. Also the current study did not include a manipulation check. Thus, it is impossible to check with certainty if the manipulation did not work as a result of fundamental flaws or external variables (e.g. the messages did not include new information for the reader).

Second, the measures were not working as expected. The measure of egoistic values had a low correlation ( $r = .48$ ) and was thus not reliable. Now the analysis is solely based on the importance people give to money and possessions, because we only used the item that was most logically connected to the outcomes of ESB. Even though ESBs lead to a reduction in costs and therefore theoretically to more money, it is a very oversimplified measurement for egoistic values that leaves no room for nuances. For example, people that care a lot about money and possessions may have already satisfied this value by having a healthy amount of money. In the case that they already have enough money or other possessions, saving a little

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bit extra money on energy prices might not be worth the effort. Also, the change in thermostat settings were insignificant. Participants were asked to first enter their average thermostat setting during the year and then what they would set their thermostat on based on the given information. In hindsight, asking for the average temperature during the year and comparing it with the intended temperature setting based on the received message probably was not an accurate measurement tool.

Third, despite the researchers trying to make clear that the study was conducted for thesis research and not for Vattenfall itself, participants might have tried to answer in a socially desirable way. Vattenfall presents itself in commercials as the company with the goal to become fossil free within one generation. Their image may have influenced the participants' answers as they want Vattenfall to see them as people with high intentions to reach that same goal. As a result of this, the participants could have overreported their intentions to engage in ESB.

Fourth, everyone that was invited to participate in this study had indicated earlier that they are open to help Vattenfall by participating in questionnaires. This may have allowed for a biased sample, as people that are willing to help their energy company are possibly also stronger involved with energy-related and environmental issues. This could explain the relatively high ESB and biospheric values, as filling in a questionnaire like this can already be seen as pro-environmental behavior.

### **Future research**

The information used in the persuasive messages during this study might did not consist of new information for the receiving individual. Due to the current energy crisis, people likely were aware of the relationship between the financial and environmental consequences of ESB and their values. For example, many governmental campaigns and news

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items during this time consisted of information on how lowering the thermostat influences a households' energy consumption leading to financial benefits. However, with more specific behaviors instead of ESBs in general, this might not be the case. In addition to that, more research on more specific ESB (i.e. showering shorter) has more practical implications. Therefore future studies could test the effect of value aligned persuasive messages in the context of behavioral change in ESB that people have less knowledge about. This could be done by avoiding subjects that are heavily brought under the attention of the population.

Depending on how the current energy crisis develops in the future, maybe other forms of ESB become more important or the financial gains as a result of ESB increase or decrease. These factors can influence the effectiveness of tailoring messages towards values. Future research should reassess these factors before conducting similar research.

Future studies could make an effort to test actual ESB, instead of measuring the intentions to engage in ESB, as these can differ. Real life studies, using persuasive messaging based on current energy consumption could be possible within the near future. For example, measuring behavior with actual (smart-)thermostat changes instead of asking participants about their changes lead to more accurate measures.

### **Conclusion**

The current study aimed to test whether value aligned persuasive messages are an effective way to increase the intention to engage in energy saving behaviors. As expected, I found that the intentions to engage in ESB were stronger for individuals with stronger biospheric values, but appeared unrelated to egoistic values. Despite the positive association between biospheric values and the intentions to engage in ESB, messages that emphasized the environmental benefits from ESB did not show an increase in persuasiveness compared to a message that merely presented how energy could be saved. Accordingly, the messages that

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emphasized the financial benefits from ESB did not show an increase in persuasiveness either. Possibly the messages did not show the persuasive effect, because people were already aware of the environmental and financial benefits as a result of ESB and at the same time already strongly endorsed strong biospheric values. Because there was no significant differences in persuasive power between the environmental and biospheric appeals, it was not possible to measure whether persuasive messages that align with the receivers values would be more effective.

### References

- IPCC, 2022: *Climate Change 2022: Impacts, Adaptation, and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press. Cambridge University Press, Cambridge, UK and New York, NY, USA, 3056 pp., doi:10.1017/9781009325844.
- EEA. (2012). *End-user GHG Emissions from Energy. Reallocation of Emissions from Energy Industries to End Users 2005-2010* (EEA Technical Report No. 18/2012). European Environment Agency, Copenhagen. Retrieved from <https://www.eea.europa.eu/publications/end-user-ghg-emissions-energy#tab-news-and-articles>
- Staats, H.J., Wit, A.P., and Midden, C.Y.H. (1996). Communicating the greenhouse effect to the public: evaluation of a mass media campaign from a social dilemma perspective. *Journal of Environmental Management* 45: 189–203.
- Schwartz, S.H. (1992). Universals in the content and structure of values: theoretical advances and empirical tests in 20 countries. In: *Advances in Experimental Social Psychology* (ed. M. Zanna), 1–65. Orlando: Academic Press.
- De Groot, J. I., & Steg, L. (2009). Mean or green: which values can promote stable pro-environmental behavior?. *Conservation Letters*, 2(2), 61-66.

## INCREASING THE RELEVANCY OF PERSUASIVE INFORMATION ON SAVING ENERGY

- De Groot, J. I., Steg, L., & Poortinga, W. (2013). Values, perceived risks and benefits, and acceptability of nuclear energy. *Risk Analysis: An International Journal*, 33(2), 307-317.
- Bolderdijk, J. W., Gorsira, M., Keizer, K., & Steg, L. (2013). Values determine the (in) effectiveness of informational interventions in promoting pro-environmental behavior. *PloS one*, 8(12), e83911.
- Van Vugt, M. (2001). Community identification moderating the impact of financial incentives in a natural social dilemma: Water conservation. *Personality and Social Psychology Bulletin*, 27(11), 1440-1449.
- Lindenberg, S., & Steg, L. (2007). Normative, gain and hedonic goal frames guiding environmental behavior. *Journal of Social issues*, 63(1), 117-137.
- Gneezy, U., & Rustichini, A. (2000). A fine is a price. *The journal of legal studies*, 29(1), 1-17.
- Heyman, J., & Ariely, D. (2004). Effort for payment: A tale of two markets. *Psychological science*, 15(11), 787-793.
- Schwartz, D., Bruine de Bruin, W., Fischhoff, B., and Lave, L. (2015). Advertising energy saving programs: the potential environmental cost of emphasizing monetary savings. *Journal of Experimental Psychology: Applied* 21: 158–166.
- Dogan, E., Bolderdijk, J. W., & Steg, L. (2014). Making small numbers count: environmental and financial feedback in promoting eco-driving behaviours. *Journal of Consumer Policy*, 37(3), 413-422.

## INCREASING THE RELEVANCY OF PERSUASIVE INFORMATION ON SAVING ENERGY

- van den Broek, K., Bolderdijk, J. W., & Steg, L. (2017). Individual differences in values determine the relative persuasiveness of biospheric, economic and combined appeals. *Journal of Environmental Psychology*, *53*, 145-156.
- Nilsson, A., Hansla, A., Heiling, J. M., Bergstad, C. J., & Martinsson, J. (2016). Public acceptability towards environmental policy measures: Value-matching appeals. *Environmental Science & Policy*, *61*, 176-184.
- Bouman, T., Steg, L., & Kiers, H. A. (2018). Measuring values in environmental research: a test of an environmental portrait value questionnaire. *Frontiers in psychology*, *9*, 564.
- Milieu Centraal. (z.d.). *Snelle bespaartips*. <https://www.milieucentraal.nl/energie-besparen/snelle-bespaartips/>
- IBM Corp. (2017). *IBM SPSS Statistics for Windows*. Armonk, NY: IBM Corp. Retrieved from <https://hadoop.apache.org>
- Abrahamse, W., Steg, L., Vlek, C. & Rothengatter, T. (2007). The effect of tailored information, goal setting, and tailored feedback on household energy use, energy-related behaviors, and behavioral antecedents. *Journal of Environmental Psychology*, *27*(4), 265–276. <https://doi.org/10.1016/j.jenvp.2007.08.002>
- Steg, L. & Groot, J. D. I. M. (2019). *Environmental Psychology: An Introduction (BPS Textbooks in Psychology)* (2de editie). Wiley-Blackwell.

## APPENDIX A

**Control message condition:**

Energie besparen wordt steeds belangrijker. Het verwarmen en koelen van het huis vergt relatief veel energie, en is bij veel huishoudens verantwoordelijk voor ongeveer 70% van het totale energieverbruik. De overige 30% van het energiegebruik dient voornamelijk voor huishoudelijke apparaten (bijvoorbeeld de wasmachine of vaatwasser).

Veel huishoudens kunnen hun energieverbruik aanzienlijk verlagen. Met de thermostaat kunt u de grootste slag slaan. Door uw thermostaat of centrale verwarming lager te zetten kunt u jaarlijks veel energie besparen. **Wist u dat:** Per graad dat u uw thermostaat lager zet, vermindert u uw energieverbruik al significant.

Tips om het overige energieverbruik effectief te verminderen zijn:

- Schakel de verwarming uit 1 uur voordat u gaat slapen of uw huis verlaat
- Gebruik de eco stand van apparaten
- Wanneer u een apparaat moet vervangen, koop dan een energie efficiënt apparaat
- Gloeilampen vervangen door LED-lampen
- Stel apparaten in zodat ze energieverbruiken op “dalmomenten”. Dat wil zeggen wanneer de vraag naar energie laag is.

**Environmental appeal condition:**

Het klimaat verandert in hoog tempo door de uitstoot van koolstofdioxide. Het opwekken van energie gaat gepaard met een hoge uitstoot aan koolstofdioxide, waardoor energie besparen steeds belangrijker wordt. Het verwarmen en koelen van het huis vergt relatief veel energie, en is bij veel huishoudens verantwoordelijk voor ongeveer 70% van het totale energieverbruik. De overige 30% van het energiegebruik dient voor huishoudelijke apparaten (bijvoorbeeld de wasmachine of vaatwasser).

Veel huishoudens kunnen hun energieverbruik aanzienlijk verlagen. Door uw thermostaat of centrale verwarming lager te zetten kunt u jaarlijks veel energie besparen. **Wist u dat:** Per graad dat u uw thermostaat lager zet, vermindert u uw jaarlijkse CO<sub>2</sub> uitstoot met **254 kilogram**. Door kleine aanpassingen te doen, draagt u bij aan een schonere en veilige omgeving voor mens en dier.



Tips om het overige energieverbruik effectief te verminderen zijn:

- Schakel de verwarming uit 1 uur voordat u gaat slapen of uw huis verlaat
- Gebruik de eco stand van apparaten
- Wanneer u een apparaat moet vervangen, koop dan een energie efficiënt apparaat
- Gloeilampen vervangen door LED-lampen
- Stel apparaten in zodat ze energieverbruiken op “dalmomenten”. Dat wil zeggen wanneer de vraag naar energie laag is.

**Financial appeal (254 euros) condition:**

Voor veel huishoudens is de energierekening verantwoordelijk voor een substantieel deel van hun maandlasten. Energie wordt steeds duurder, waardoor energie besparen steeds belangrijker wordt. Het verwarmen en koelen van het huis vergt relatief veel energie, en is bij veel huishoudens verantwoordelijk voor ongeveer 70% van het totale energieverbruik. De overige 30% van het energiegebruik dient voor huishoudelijke apparaten (bijvoorbeeld de wasmachine of vaatwasser).

Veel huishoudens kunnen hun energieverbruik aanzienlijk verlagen. Door uw thermostaat of centrale verwarming lager te zetten kunt u jaarlijks veel energie besparen. **Wist u dat:** Per graad dat u uw thermostaat lager zet, bespaart u jaarlijkse gemiddeld **254 euro**. Door kleine aanpassingen te doen, houdt u meer geld over aan het einde van het jaar.

Tips om het overige energieverbruik effectief te verminderen zijn:

- Schakel de verwarming uit 1 uur voordat u gaat slapen of uw huis verlaat
- Gebruik de eco stand van apparaten Wanneer u een apparaat moet vervangen, koop dan een energie efficiënt apparaat
- Gloeilampen vervangen door LED-lampen
- Stel apparaten in zodat ze energieverbruiken op “dalmomenten”. Dat wil zeggen wanneer de vraag naar energie laag is.

**Financial appeal (86 euros) condition:**

Voor veel huishoudens is de energierekening verantwoordelijk voor een substantieel deel van hun maandlasten. Energie wordt steeds duurder, waardoor energie besparen steeds belangrijker wordt. Het verwarmen en koelen van het huis vergt relatief veel energie, en is bij veel huishoudens verantwoordelijk voor ongeveer 70% van het totale energieverbruik. De overige 30% van het energiegebruik dient voor huishoudelijke apparaten (bijvoorbeeld de wasmachine of vaatwasser).

Veel huishoudens kunnen hun energieverbruik aanzienlijk verlagen. Door

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uw thermostaat of centrale verwarming lager te zetten kunt u jaarlijks veel energie besparen. **Wist u dat:** Per graad dat u uw thermostaat lager zet, bespaart u jaarlijkse gemiddeld **86 euro**. Door kleine aanpassingen te doen, houdt u meer geld over aan het einde van het jaar.

Tips om het overige energieverbruik effectief te verminderen zijn:

- Schakel de verwarming uit 1 uur voordat u gaat slapen of uw huis verlaat
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- Gloeilampen vervangen door LED-lampen
- Stel apparaten in zodat ze energieverbruiken op “dalmomenten”. Dat wil zeggen wanneer de vraag naar energie laag is.