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Psychological and country characteristics influencing energy efficient behaviour and the underlying processes

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Psychological and country characteristics influencing energy efficient behaviour and the underlying processes

Ellen van der Werff , Angela Ruepert, & Linda Steg[a]

[a] University of Groningen

Table of Contents

1. Summary

To effectively reduce environmental problems caused by fossil energy use people need to adopt sustainable energy behaviours. In this report we aimed to test which factors influence sustainable energy behaviours. We used the data from the large survey collected among 4478 households in Switzerland, Italy, and the Netherlands to test which factors influence sustainable energy behaviour. Furthermore, we conducted an experiment in collaboration with energy company Qurrent in the Netherlands testing strategies to promote sustainable energy behaviour.

Overall, our results from the large survey show that sustainable energy behaviours are particularly strongly related to the variables from the Value-identity-personal norm model. The more people care about nature and the environment, the more they see themselves as a pro-environmental person, and the more they feel morally obliged to save energy the more likely they are to engage in a range of sustainable energy behaviours. We found this for sustainable energy behaviours focussing on electricity use as well as gas use. The causal structure of the VIP model was somewhat supported by our data. Our results suggest that to promote a range of sustainable energy behaviours organizations and governments should aim to target biospheric values, environmental self-identity and personal norms. Strategies that focus people on these factors or strengthen these factors are likely to promote a range of sustainable energy behaviours.

The results from the large survey also show there is a different route to sustainable energy behaviour, namely via the extent to which people think their utility aims to reduce its environmental impact (CER). The more people think their utility aims to reduce its environmental impact the more likely they are to engage in sustainable energy behaviours. Furthermore, we found that people internalize these aims of their utility as CER influences sustainable energy behaviour via personal norms. CER also influences sustainable energy behaviour externally via social norms. However, interestingly, we found more support for the impact of CER on sustainable energy behaviour via personal norms. This suggests that policy makers and organizations can promote sustainable energy behaviours by showing that they aim to reduce their environmental impact. When people think their organization or government aims to reduce its environmental impact they may be more likely to do so as well.

The findings from the experiment conducted in collaboration with utility company Qurrent show that the extent to which people think their utility aims to reduce its environmental impact influences investment in wind energy production shares. Interestingly, the extent to which people think their utility aims to reduce their environmental impact is likely to influence which type of message is most effective in promoting sustainable energy behaviour. Our results suggest that when organizations are perceived as aiming to reduce their environmental impact an environmental message is more likely to effectively promote sustainable energy behaviour. However, when people think the organization does not aim to reduce its environmental impact an environmental message is not effective. In that case, a different message such as a financial message may be more effective in promoting sustainable energy behaviour.

2. Aim of the report

2.1 Introduction

In this report, we discuss findings from the large survey on psychological and country characteristics influencing energy efficient behaviour and the underlying processes (see also PENNY report 1.3). We present the results from the large survey conducted among customers of utilities in the three countries: Italy (Eni), Netherlands (Qurrent), and Switzerland (Stadtwerk Winterthur). These findings are relevant for, and will serve as, input to policies encouraging energy efficient behaviours. Furthermore, we will discuss an experiment conducted in the Netherlands in collaboration with Qurrent, in which we tested the effects of an environmental and a financial message on energy behaviour.

Objectives

- Provide insights into the psychological factors related to energy use behaviours
- Asses the relationship between individual and country characteristics and energy efficiency behaviours
- Test the influence of environmental and financial information on energy behaviour

Even though engaging in sustainable energy behaviours in general is somewhat costly or bothersome, research on sustainable energy behaviour in the private sphere has shown that many people are willing and motivated to engage in sustainable energy behaviours (Abrahamse, Steg, Vlek, & Rothengatter, 2007; Harland, Staats, & Wilke, 2007; Steg, Bolderdijk, Keizer, & Perlaviciute, 2014a). For example, although it may be somewhat uncomfortable to lower the temperature in your home and it may be more effortful to switch of your appliances instead of leaving them on standby, many people do so. A key question is: What motivates these people to engage in these sustainable energy behaviours? Research shows that people are more motivated and willing to engage in sustainable energy behaviour when they are focused on doing the right thing such as benefiting the environment, rather than merely on the convenience and financial costs related to these behaviours (Lindenberg & Steg, 2007; Lindenberg, 2012; Steg et al., 2014a). Hence, a key question is which factors determine the extent to which people focus on benefiting the environment and to what extent this in turn influences people's willingness to engage in sustainable energy behaviour. The Integrated Framework for Encouraging Pro-environmental behaviour (IFEP: Steg et al., 2014a) proposes that the extent to which people are focused on the environment depends on the values people strongly endorse and on contextual factors that make them focus on value-relevant consequences. We will first discuss which values are important for sustainable energy behaviours, and explain that particularly biospheric values (i.e., valuing nature and the environment) are a consistent predictor of sustainable energy efficient actions. Subsequently, we will discuss and test the process through which biospheric values influence energy efficient behaviours. Next, we will discuss how contextual factors (i.e., the extent to which the utility aims to minimize its negative impact on the environment) can influence sustainable energy behaviours and via which process.

To what extent and how do values influence energy efficient behaviours?

Values can be defined as a guiding principle in one's life (Schwartz, 1992). Four types of values are particularly important for pro-environmental behaviour and therefore most likely to predict sustainable energy behaviour (Steg et al., 2014b). First, energy efficient behaviour can be influenced by egoistic and hedonic values. People with strong egoistic values particularly care about enhancing their resources, for example money, status and power. People with strong hedonic values particularly care about implications of their behaviour for comfort and pleasure. Generally, the stronger one's egoistic or hedonic values, the less likely people are to act pro-environmentally. As sustainable energy behaviours are often somewhat effortful or comfortable, such as lowering the temperature in your home and unplugging appliances, we expect that egoistic and hedonic values reduce the likelihood that people engage in sustainable energy behaviours. Sustainable energy behaviour can also be influenced by altruistic and biospheric values. People with strong altruistic values particularly care about the wellbeing of others, people with strong biospheric values particularly care about nature and the environment. Altruistic values and particularly biosperic values are generally positively related to pro-environmental behaviour. We will test if altruistic and biospheric values are positively related to sustainable energy behaviour as well. In sum, we will test the relationships between egoistic, hedonic, altruistic, and biospheric values and a range of sustainable energy behaviours. We will not only focus on behaviour regarding electricity use, but also on behaviours related to gas use.

How do values influence behaviour

We will additionally test how values affect behaviour. Specifically, we will examine whether values influence sustainable energy behaviours via environmental self-identity and personal norms. Environmental self-identity reflects the extent to which people see themselves as a pro-environmental person (Van der Werff, Steg, & Keizer, 2013). We will test if people who care about nature and the environment, that is, who have strong biospheric values, are more likely to see themselves as a pro-environmental person (i.e. have a strong environmental self-identity). Furthermore, we will test environmental self-identity in turn increase the extent to which people feel morally obliged to save energy (i.e. have a strong personal norm to save energy). Finally, we will test if personal norm influences sustainable energy behaviours. In sum, we will test the values-identity-personal norms model (VIP model), see Figure 1. Research has found support for this model in explaining energy use at work and participation in a smart energy system (Ruepert et al., 2016; Van der Werff & Steg, 2016). We will test if the VIP model predicts sustainable energy behaviours among households in Italy, Switzerland and the Netherlands.

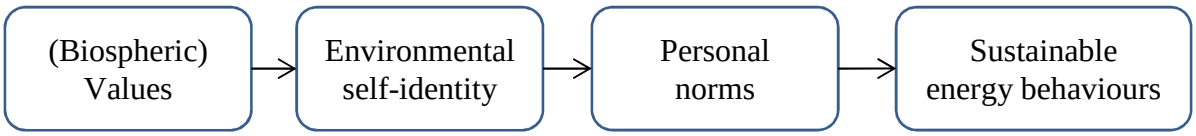

Figure 1: The Value-Identity-Personal norm model (VIP model)

To what extent and how do contextual factors influence energy efficient behaviours?

Behaviour is not only influenced by individual factors such as the variables from the VIP model, but also depends on the context. Contextual factors may affect the extent to which people are focused on benefiting the environment and thus the likelihood that they engage in sustainable

energy behaviour (Steg et al., 2014a). Previous research for example showed that the extent to which you think your organization aims to reduce its environmental impact influences pro-environmental behaviour among employees (Ruepert, Keizer, & Steg, 2017). When people think their organization aims to reduce its environmental impact, they are more likely to act pro-environmental at work. Interestingly, this is particularly the case for people who do not strongly care about the environment. When people not strongly care about the environment, they are more likely to act pro-environmental when they think their organization aims to reduce its environmental impact. In this report we will extend this research, and examine whether the extent to which a company is believed to aim to reduce its environmental impact not only affects environmental behaviour of employees, but also of customers. Specifically, we aim to test if the extent to which people think their utility aims to reduce its environmental impact enhances their sustainable energy behaviours.

Importantly, we will test why the extent to which people think their utility aims to reduce its environmental impact influences sustainable energy behaviour, that is, whether the utility endorses corporate environmental responsibility (CER). Do people internalize these signs that the utility aims to reduce its environmental impact, signalling that the utility finds it important to be energy efficient, and feel a stronger personal norm to save energy? Or does the extent to which people think their utility aims to reduce its environmental impact influence sustainable energy behaviour because people think others do so and expect you to do so? In other words, does the extent to which a utility is believed to aim to reduce its environmental impact enhance one's intrinsic motivation (i.e., personal norms), or extrinsic motivation (i.e., social norms) to engage in energy efficiency behaviour? Hence, we will test the two models below in the large survey conducted in collaboration with utility companies in Switzerland, Italy and the Netherlands.

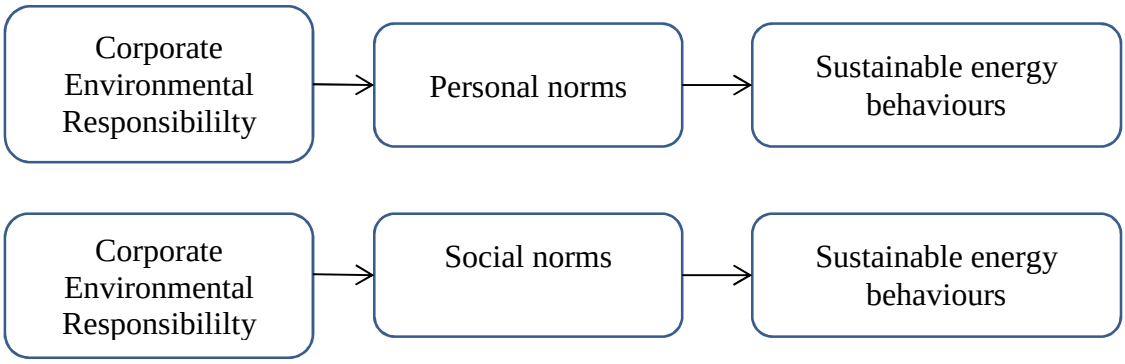

Figure 2: The relationship between corporate environmental responsibility (CER) and sustainable energy behaviour via personal norms and via social norms.

2.2 Acknowledgements

We would like to express our thanks to our contact persons at Eni, Qurrent, Stadtwerk Winterthur and Aziende Industriali Lugano for the fruitful collaboration.

3. Method Study 1

3.1 Introduction

We conducted a large survey in the three countries (Italy, Netherlands, Switzerland) to examine relationships between individual characteristics and energy efficient behaviours. In the large survey, we included measures for the different individual characteristics (values, environmental self-identity, personal norms, and social norms) and self-reported energy efficient behaviours. The survey was designed jointly by the case study teams and comprised of the same key set of questions. To ensure that the data from the different countries can be compared the survey was developed in English and each team translated the survey into their own language. For details on the large survey, see PENNY report 1.3.

3.2 Procedure and sample characteristics

The survey was distributed and collected via different online survey programs. Participants filled out the online survey consisting of different parts (modules). In total, 4478 completed the survey. First, we wanted to ensure that the participants were qualified to participate and asked them if they are a customer of the specific utility of their principal residence, if they are the person in the residence responsible for making purchase decisions and the payments of bills, and if they are living in their current residence since before January 1st 2017. If the participant was qualified according to these criteria, questions followed on the characteristics of one's residence and the appliances in their residence. These items are not relevant for the current report and will not be further discussed. Next, we included self-reported energy-related behaviours, followed by measures for values, environmental self-identity, personal norms, perceptions of corporate environmental responsibility and social norms. The survey ended with some general questions about gender, age, household type, level of education, career status, and income.

3.3 Measures

For the current analyses we focus on the following measures: biospheric values, environmental self-identity, personal norms, the extent to which people think their company aims to reduce its environmental impact (CER), social norms, and sustainable energy behaviour. A detailed description of these measures can be found in report 1.3.

We included the following items to measure energy efficient behaviours: Running only full loads when using the dishwasher or the washing machine, Turning off the lights when leaving a room even for a short period of time; Completely switching off electronic devices (TV, computer) [no standby]. Participants indicated how often they engaged in these behaviours on a scale ranging from 1 (Never) to 5 (Always).

4. Results Study 1

4.1 Correlations

For each country we calculated the correlations between the psychological measures and the sustainable energy behaviours for electricity use (washing with a full load; switching off lights when leaving a room; switching off appliances). See Table 1.

	Switzerland			Italy			The Netherlands		
									
Altruistic values	.13**	.18**	.11**	.15**	.12**	.10**	.05*	.06**	.11**
Biospheric values	.15**	.27**	.19**	.11**	.12**	.15**	.07**	.14**	.17**
Egoistic values	-.10**	-.05	-.07*	-.10**	-.06*	-.04	-.05*	-.03	-.06**
Hedonic values	-.04	-.03	-.11**	-.04	-.03	-.07**	.02	-.02	-.06*
Env. self-identity	.17**	.25**	.21**	.14**	.16**	.18**	.11**	.21**	.23**
CER	.07*	.10**	.09**	.08**	.11**	.13**	.03	.04	.08**
Personal norms	.16**	.25**	.20**	.14**	.21**	.20**	.11**	.19**	.20**
Social norms	.03	.10**	.03	.09**	.14**	.13**	.05*	.12**	.12**

*Table 1: The correlations between on the one hand values, environmental self-identity, CER, personal norms and social norms, and on the other hand the sustainable energy behaviours for electricity use *p < .05, ** p < .01*

Next, we calculated the correlations between the psychological measures and the sustainable energy behaviours for gas use in each country (the temperature setting at home during the day; the temperature setting at home at night). See Table 2.

	Switzerland		Italy		The Netherlands	
						
Altruistic values	-.08*	-.13**	-.05	-.08**	-.02	-.09**
Biospheric values	-.17**	-.19**	-.06*	-.06*	-.12**	-.13**

Egoistic values	.06*	.05	.11**	.13**	.08**	.13**
Hedonic values	.08*	.11**	.09**	.11**	.03	.05*
Env. self-identity	-.14**	-.17**	-.08**	-.09**	-.10**	-.12**
Personal norms	-.11**	-.15**	-.09**	-.07*	-.10**	-.10**
Corporate env. respons.	-.04	-.13**	-.01	-.01	-.06*	-.12**
Social norms	.02	-.00	-.00	-.03	-.03	-.05*

*Table 2: The correlations between on the one hand values, environmental self-identity, CER, personal norms and social norms, and on the other hand the sustainable energy behaviours for gas use. *p* < .05, ** *p* < .01*

Our findings are in line with research showing that values influence environmental behaviour. Our findings show that in all countries altruistic and particularly biospheric values are positively related to sustainable energy behaviour. The more people care about nature and the environment, the more likely they are to wash with a full load, switch off lights when they leave a room and switch off appliances instead of leaving them on standby. Furthermore, the stronger one's biospheric values the lower the temperature setting at home during the day as well as at night. We found similar but weaker effects for people with strong altruistic values. We found the opposite pattern of results for egoistic and hedonic values, although the relationships were much weaker. Overall, the stronger one's egoistic and hedonic values, the less likely one is to wash with a full load, to switch off appliances when leaving a room and to switch off appliances instead of leaving them on standby. Also, the stronger one's egoistic and hedonic values the higher the temperature setting at home during the day and at night.

Additionally, we found that in all countries environmental self-identity and personal norms are positively and relatively strongly related to energy saving behaviours. The stronger one's environmental self-identity or personal norm, the more likely one is to wash with a full load, switch off lights and appliances and the lower the temperature setting in the home during the day and at night.

Corporate environmental responsibility and social norms are positively but relatively weakly related to energy saving behaviours in all countries. The more one thinks one's energy provider aims to reduce its environmental impact, the more likely one is to wash with a full load, switch off lights and appliances, and the lower one's temperature setting at home during the day and at night. However, in Italy, CER was not related to the temperature setting at home. We found that the more one thinks that other people think you should save energy or try to save energy, the more likely one is to wash with a full load and switch off lights and appliances. Social norms were hardly related to the temperature setting at home, we only found that in the Netherlands social norms are related to the temperature setting at home.

4.2 Testing our models

How do values affect sustainable energy behaviours?

Next we tested the relationships between the variables from the VIP model and sustainable energy behaviour in all three countries. Our findings show that in Switzerland, Italy, and the Netherlands, stronger biospheric values are related to a stronger environmental self-identity. Environmental self-identity is in turn strongly related to personal norm. The stronger one's environmental self-identity, the more one feels morally obliged to save energy. Stronger personal norm were in turn related to more sustainable energy behaviour in general, although the relationships are rather weak. In Switzerland and the Netherlands, the VIP model only significantly predicted switching of the lights. In Italy we found that the VIP model significantly predicted the likelihood that people switch off their lights, switch off appliances, wash with a full load, and have a lower temperature setting during the day, see Figure 3, 4, and 5. We found support for the relationships proposed by the VIP model for washing with a full load and for switching off lights in Italy and the Netherlands. Furthermore, in Italy the relationships of the VIP model were supported for switching off appliances. In Switzerland we did not find support for the VIP model, see Table 3, 4, 5, 6, and 7.

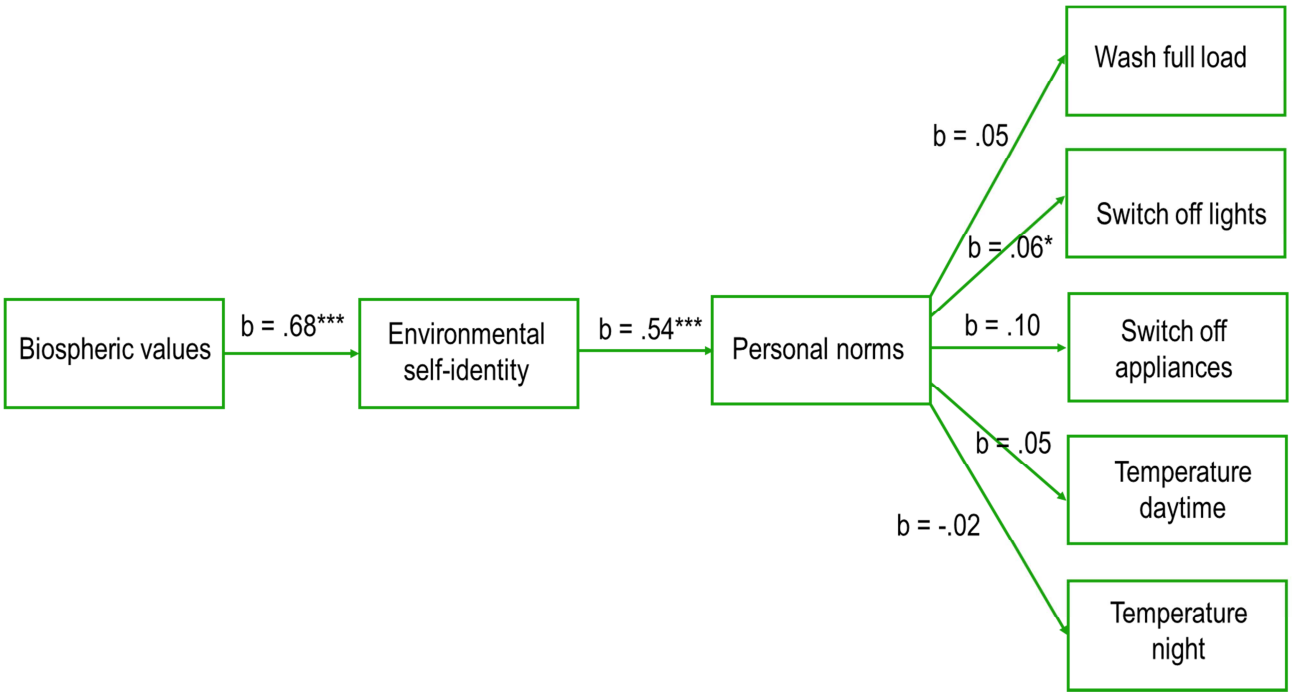

Figure 3. Test of VIP model in Switzerland (*p < .05, ** p < .01, *** p < .001)

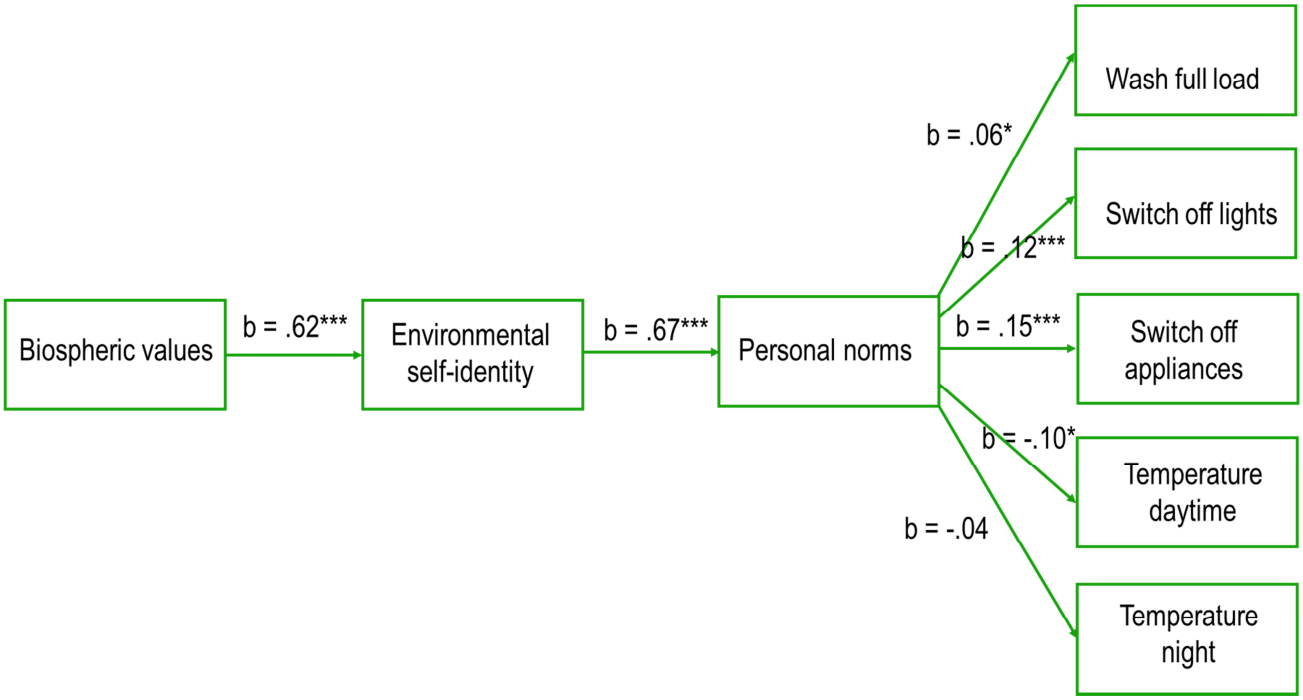

Figure 4. Test of the VIP model in Italy (*p < .05, ** p < .01, *** p < .001)

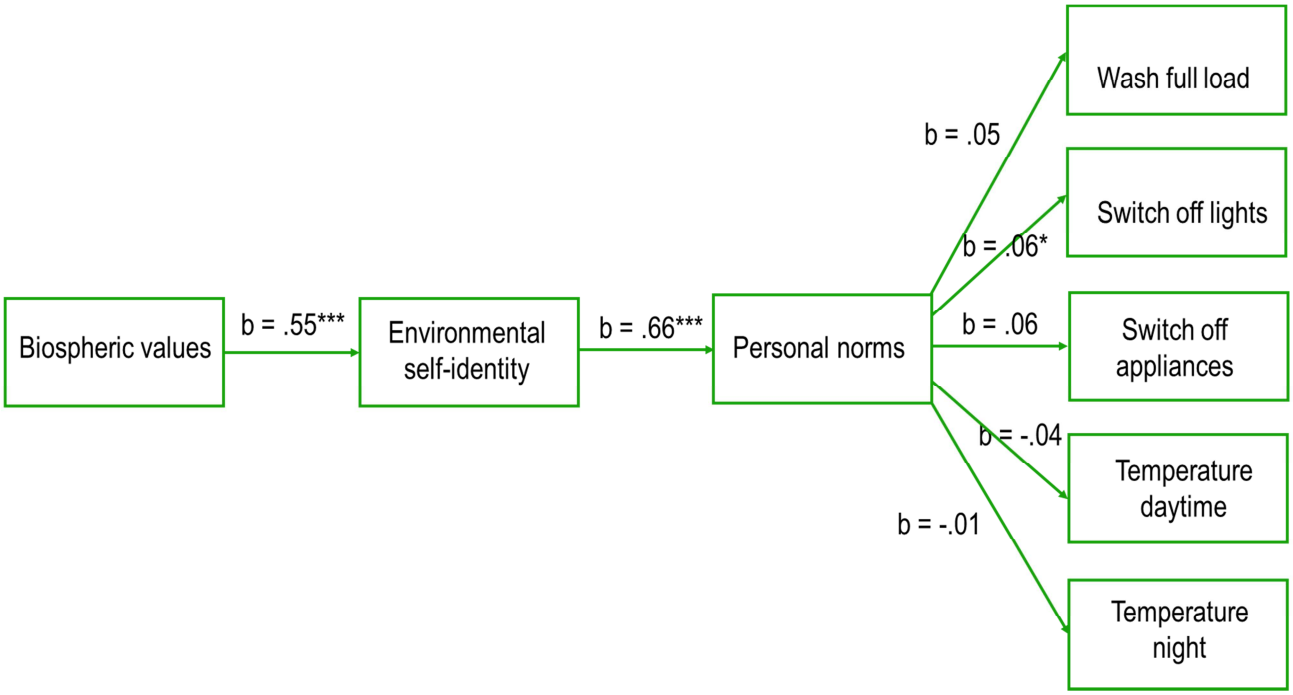

Figure 5. Test of the VIP model in the Netherlands (*p < .05, ** p < .01, *** p < .001)

Indirect Effects				
Switzerland				
	Effect	BootSE	LL95%CI	UL95%CI
Total	.07	.02	.03	.12
Bio.values → env. self-identity → washing full loads	.04	.02	-.01	.09
Bio.values → personal norms → washing full loads	.02	.01	-.00	.04
Bio.values → env. self-identity → personal norms → washing full loads	.01	.01	-.00	.03
Italy				
Total	.07	.03	.02	.13
Bio.values → env. self-identity → washing full loads	.03	.03	-.02	.09
Bio.values → personal norms → washing full loads	.03	.01	.00	.05
Bio.values → env. self-identity → personal norms → washing full loads	.01	.01	.00	.03
the Netherlands				
Total	.05	.01	.02	.08
Bio.values → env. self-identity → washing full loads	.03	.02	.00	.06
Bio.values → personal norms → washing full loads	.02	.01	-.01	.04
Bio.values → env. self-identity → personal norms → washing full loads	.01	.01	.00	.02

Table 3: The indirect effects of the VIP model on washing with full loads in Italy, Switzerland and the Netherlands

Indirect Effects				
Switzerland				
	Effect	BootSE	LL95%CI	UL95%CI
Total	.08	.02	.04	.14
Bio.values → env. self-identity → switching off lights	.04	.03	-.01	.09
Bio.values → personal norms → switching off lights	.02	.01	-.00	.05
Bio.values → env. self-identity → personal norms → switching off lights	.02	.01	-.00	.04
Italy				
Total	.09	.02	.05	.12
Bio.values → env. self-identity → switching off lights	.01	.02	-.04	.05
Bio.values → personal norms → switching off lights	.05	.01	.03	.07
Bio.values → env. self-identity → personal norms → switching off lights	.03	.01	.01	.04
the Netherlands				
Total	.08	.01	.06	.11
Bio.values → env. self-identity → switching off lights	.05	.01	.02	.08
Bio.values → personal norms → switching off lights	.02	.01	.00	.04
Bio.values → env. self-identity → personal norms → switching off lights	.01	.00	.00	.02

Table 4: The indirect effects of the VIP model on switching off lights in Italy, Switzerland and the Netherlands

Indirect Effects				
Switzerland				
	Effect	BootSE	LL95%CI	UL95%CI
Total	.15	.04	.07	.22
Bio.values → env. self-identity → switching off appliances	.09	.04	.01	.17
Bio.values → personal norms → switching off appliances	.04	.02	-.01	.08
Bio.values → env. self-identity → personal norms → switching off appliances	.03	.02	-.00	.07
Italy				
Total	.16	.03	.09	.22
Bio.values → env. self-identity → switching off appliances	.06	.04	-.01	.13
Bio.values → personal norms → switching off appliances	.06	.02	.03	.10
Bio.values → env. self-identity → personal norms → switching off appliances	.03	.01	.01	.06

the Netherlands				
Total	.12	.02	.09	.16
Bio.values → env. self-identity → switching off appliances	.09	.02	.05	.14
Bio.values → personal norms → switching off appliances	.02	.01	-.01	.05
Bio.values → env. self-identity → personal norms → switching off appliances	.01	.01	-.00	.02

Table 5: The indirect effects of the VIP model on switching off appliances in Italy, Switzerland and the Netherlands

Indirect Effects				
Switzerland				
	Effect	BootSE	LL95%CI	UL95%CI
Total	-.03	.04	-.11	.05
Bio.values → env. self-identity → day temperature setting	-.06	.04	-.15	.03
Bio.values → personal norms → day temperature setting	.02	.02	-.02	.06
Bio.values → env. self-identity → personal norms → day temperature setting	.02	.02	-.02	.06
Italy				
Total	-.09	.04	-.17	-.02
Bio.values → env. self-identity → day temperature setting	-.03	.04	-.11	.05
Bio.values → personal norms → day temperature setting	-.04	.02	-.08	.00
Bio.values → env. self-identity → personal norms → day temperature setting	-.02	.01	-.04	-.00
the Netherlands				
Total	-.04	.02	-.09	.00
Bio.values → env. self-identity → day temperature setting	-.02	.03	-.07	.03
Bio.values → personal norms → day temperature setting	-.01	.02	-.05	.02
Bio.values → env. self-identity → personal norms → day temperature setting	-.01	.01	-.02	.01

Table 6: The indirect effects of the VIP model on temperature setting at home during daytime in Italy, Switzerland and the Netherlands

Indirect Effects				
Switzerland				
	Effect	BootSE	LL95%CI	UL95%CI
Total	-.11	.05	-.21	-.00
Bio.values → env. self-identity → night temperature setting	-.09	.06	-.21	.03
Bio.values → personal norms → night temperature setting	-.01	.03	-.07	.05
Bio.values → env. self-identity → personal norms → night temperature setting	-.01	.03	-.06	.04

Italy				
Total	-.10	.04	-.18	-.02
Bio.values → env. self-identity → night temperature setting	-.08	.04	-.16	.01
Bio.values → personal norms → night temperature setting	-.02	.02	-.06	.03
Bio.values → env. self-identity → personal norms → night temperature setting	-.01	.01	-.03	.01
the Netherlands				
Total	-.05	.03	-.10	.00
Bio.values → env. self-identity → night temperature setting	-.04	.03	-.11	.02
Bio.values → personal norms → night temperature setting	-.00	.02	-.04	.03
Bio.values → env. self-identity → personal norms → night temperature setting	-.00	.01	-.02	.01

Table 7: The indirect effects of the VIP model on temperature setting at home at night in Italy, Switzerland and the Netherlands

How CER affects sustainable energy behaviours

We tested how the perceived corporate environmental responsibility of the utility influences sustainable energy behaviours. We tested if CER influences behaviour via personal norms or social norms. Our findings show that in Switzerland, Italy, and the Netherlands CER is related to personal norms and to social norms. The more one thinks one's utility aims to reduce its environmental impact the more one feels morally obliged to save energy and the more likely one is to think that others save energy and think you should save energy. In all countries we found that personal norm is in turn strongly related to all sustainable energy behaviours. The more people feel morally obliged to save energy the more likely they are to wash with a full light, switch off lights and appliances and the lower their temperature at home during the day and at night. Social norms were to a lesser extent also related to sustainable energy behaviours. In all countries social norms were related to switching off lights. In Italy and the Netherlands social norms were also related to switching off appliances and washing with a full load. Social norms did not influence temperature setting. For an overview see Figure 6, 7, and 8.

We tested the relationships proposed in the models. More specifically, we tested if CER influences sustainable energy behaviours via personal norms. And if CER influences sustainable energy behaviours via social norms, see Table 8, 9, 10, 11 and 12. In all countries and for all behaviours our findings show that CER influences sustainable energy behaviour via one's personal norm. Suggesting that people internalize the environmental responsibility of the utility and feel morally obliged to save energy. We also found support for the model proposing that CER influences sustainable energy behaviour via social norms. However, we did not find support for the model when the sustainable energy behaviour was the temperature setting at home at night. This suggests that CER also influences sustainable energy behaviour because it is a more external motivation, however to a lesser extent.

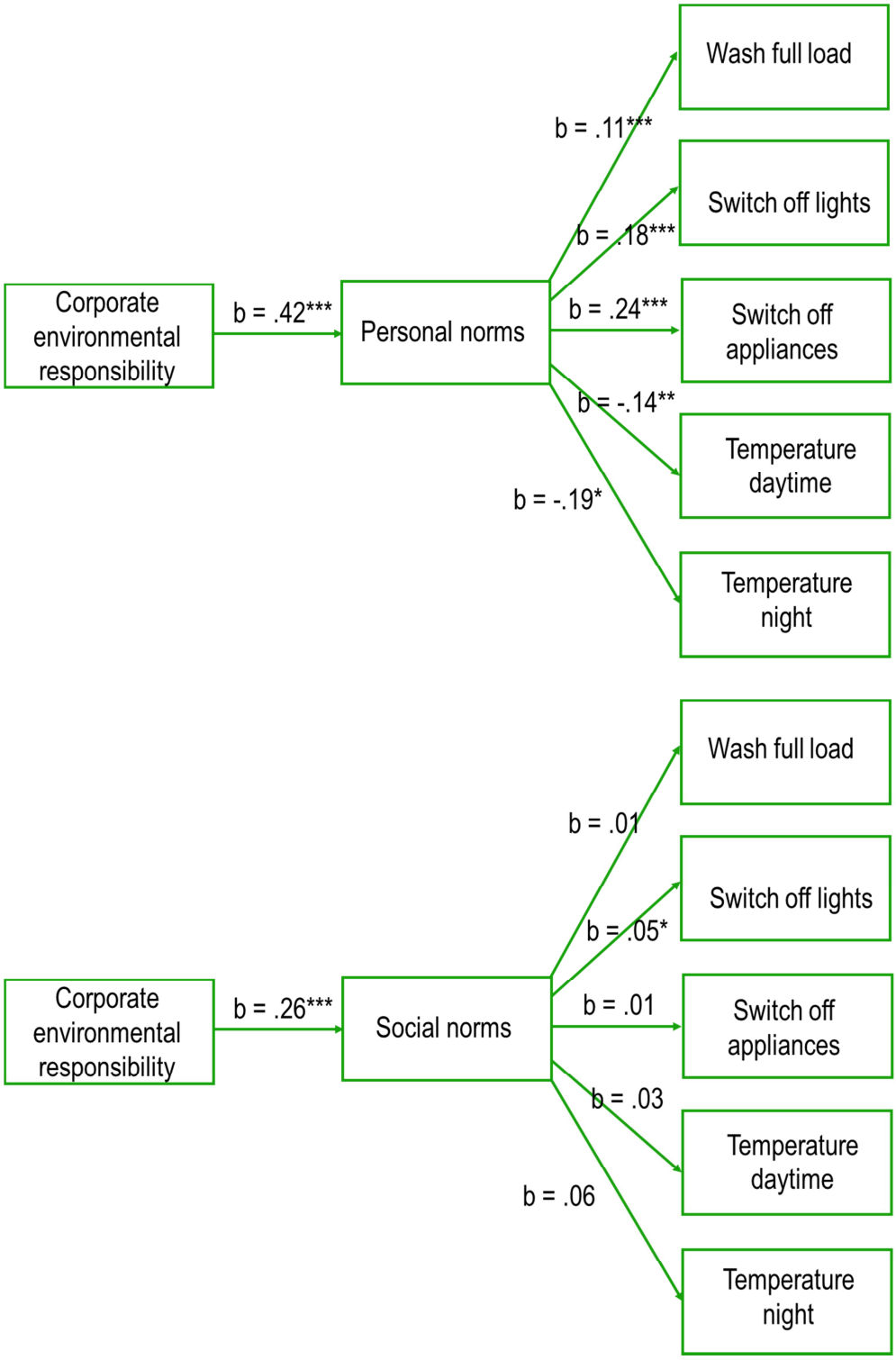

Figure 6. Model testing how CER affects energy efficient behaviour in Switzerland (*p < .05, ** p < .01, *** p < .001)

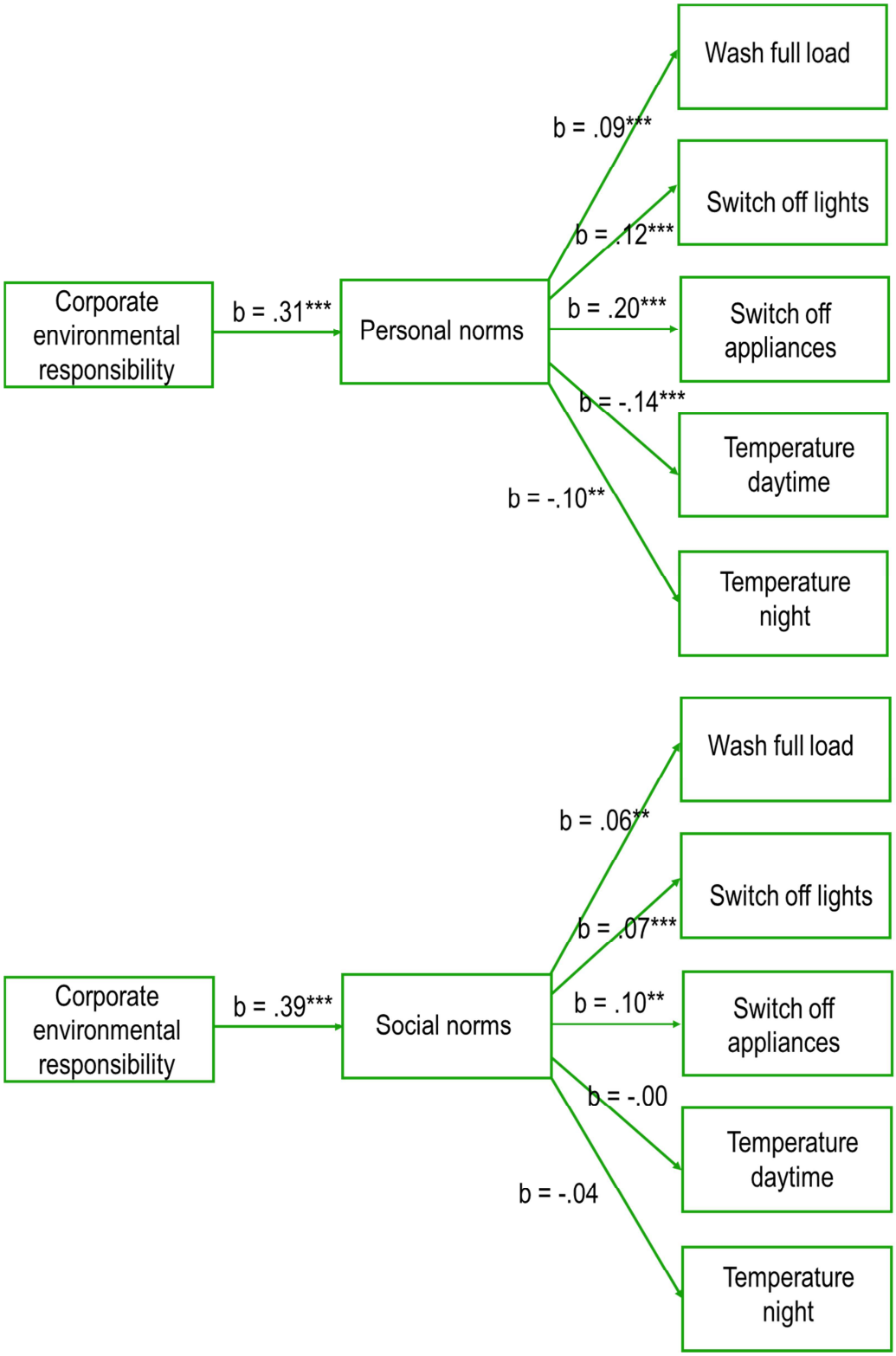

Figure 7. Model testing how CER affects energy efficient behaviour in Italy (*p < .05, ** p < .01, *** p < .001)

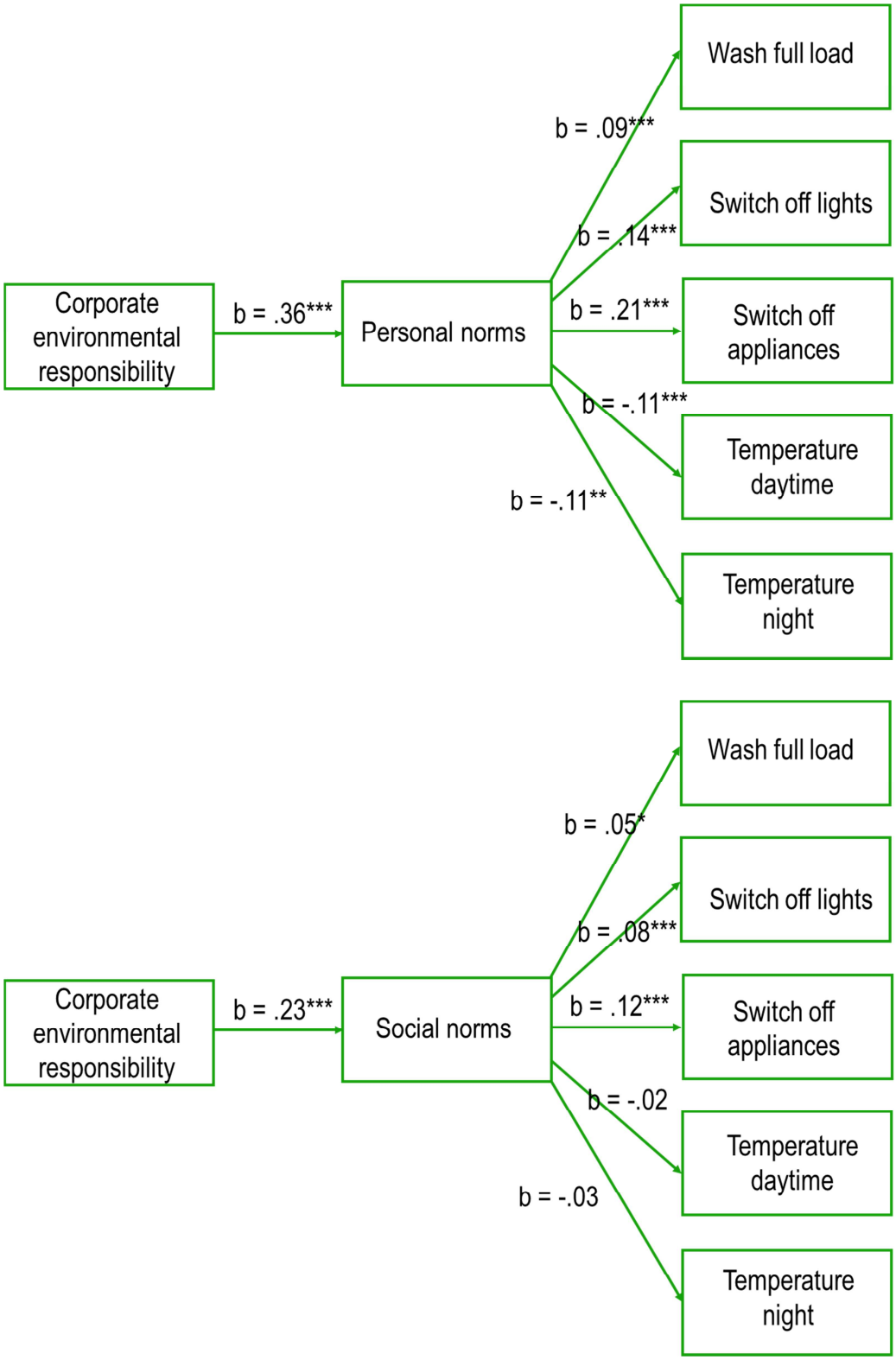

Figure 8. Model testing how CER affects energy efficient behaviour in the Netherlands (*p < .05, ** p < .01, *** p < .001)

Indirect Effects				
Switzerland				
	Effect	BootSE	LL95%CI	UL95%CI
CER → PN → washing	.05	.01	.02	.07
CER → SN → washing	.00	.01	.00	.08
Italy				
CER → PN → washing	.03	.01	.01	.04
CER → SN → washing	.02	.01	.01	.04
the Netherlands				
CER → PN → washing	.03	.01	.02	.05
CER → SN → washing	.01	.00	.00	.02

Table 8: The indirect effects of CER on washing with full loads via personal norms and social norms in Switzerland, Italy, and the Netherlands

Indirect Effects				
Switzerland				
	Effect	BootSE	LL95%CI	UL95%CI
CER → PN → lights	.07	.01	.05	.10
CER → SN → lights	.01	.01	.01	.09
Italy				
CER → PN → lights	.04	.01	.03	.05
CER → SN → lights	.03	.01	.01	.04
the Netherlands				
CER → PN → lights	.05	.01	.04	.07
CER → SN → lights	.02	.00	.01	.03

Table 9: The indirect effects of CER on switching off the lights via personal norms and social norms in Switzerland, Italy, and the Netherlands

Indirect Effects				
Switzerland				
	Effect	BootSE	LL95%CI	UL95%CI
CER → PN → appliances	.10	.02	.06	.14
CER → SN → appliances	.00	.01	.02	.16
Italy				
CER → PN → appliances	.06	.01	.04	.08
CER → SN → appliances	.04	.01	.01	.06
the Netherlands				
CER → PN → appliances	.08	.01	.06	.10
CER → SN → appliances	.03	.01	.01	.04

Table 10: The indirect effects of CER on switching off appliances via personal norms and social norms in Switzerland, Italy, and the Netherlands

Indirect Effects				
Switzerland				
	Effect	BootSE	LL95%CI	UL95%CI
CER → PN → temp. day	-.06	.02	-.10	-.02
CER → SN → temp. day	.01	.01	-.01	.03
Italy				
CER → PN → temp. day	-.04	.01	-.07	-.02
CER → SN → temp. day	-.00	.01	-.03	.03
the Netherlands				
CER → PN → temp. day	-.04	.01	-.06	-.02
CER → SN → temp. day	-.01	.01	-.02	.01

Table 11: The indirect effects of CER on temperature setting at home during the day via personal norms and social norms in Switzerland, Italy, and the Netherlands

Indirect Effects				
Switzerland				
	Effect	BootSE	LL95%CI	UL95%CI
CER → PN → temp. night	-.08	.05	-.13	-.03
CER → SN → temp. night	.01	.01	-.01	.04
Italy				
CER → PN → temp. night	-.03	.01	-.06	-.01
CER → SN → temp. night	-.02	.01	-.04	.01
the Netherlands				
CER → PN → temp. night	-.04	.01	-.07	-.01
CER → SN → temp. night	-.01	.01	-.02	.01

Table 12: The indirect effects of CER on temperature setting at home at night via personal norms and social norms in Switzerland, Italy, and the Netherlands

Overall, our results show that sustainable energy behaviours are particularly strongly related to the variables from the Value-identity-personal norm model. The more people care about nature and the environment the more likely they are to engage in sustainable energy behaviours. The more people see themselves as a pro-environmental person, the more likely they are to engage in sustainable energy behaviour. Finally, the more people feel morally obliged to save energy the more likely they are to engage in sustainable energy behaviour. We found some support for the causal structure of the VIP model. However, our results do suggest that to promote a range of sustainable energy behaviours organizations and governments should aim to target biospheric values, environmental self-identity and personal norms. Strategies that focus people on these factors or strengthen these factors are likely to promote a range of sustainable energy behaviours.

We also tested and found support for a different route promoting sustainable energy behaviour, namely via the extent to which people think their utility aims to reduce its environmental impact (CER). The more people think their utility aims to reduce its environmental impact the more likely they are to engage in sustainable energy behaviours. Furthermore, we found that people internalize these aims of their utility as CER influences sustainable energy behaviour via personal

norms. CER also influences sustainable energy behaviour externally via social norms. However, interestingly, we found more support for the route via personal norms. This suggests that policy makers and organizations can promote sustainable energy behaviours by showing that they aim to reduce their environmental impact. When people think their organization or government aims to reduce its environmental impact they may be more likely to do so as well.

Study 2

We conducted a second study in collaboration with energy company Qurrent in the Netherlands. The study aimed to examine what motivates customers to buy shares in wind energy. Qurrent offers its customers the opportunity to buy a piece of a windmill by buying shares of windmills. For 55 euro, customers receive at least 250 kWh of electricity for five years. The aim of this study was to test the effectiveness of two types of messages aimed to promote wind shares: an environmental and a financial message. Furthermore, we aimed to test if the effectiveness of the message differs depending on the extent to which people think the utility aims to reduce its environmental impact.

5. Method Study 2

5.1 Procedure and sample characteristics

A link to an online questionnaire was sent to 5000 customers of Qurrent. In total 299 customers filled out the survey, a response rate of 6%. The sample consisted of 201 males, 91 females; 7 participants did not indicate their gender. Age ranged from 22 to 84 (*Mean* = 53, *Standard deviation* = 13.8); 19% of the respondents was living alone, 40% lived with their partner, 31% lived with their partner and children, and 10% had a different living situation.

5.2 Materials

5.2.1 Manipulation

We tested the influence of two messages on the intention to invest shares in wind energy production. Participants were randomly assigned to one of two conditions: they either received a message promoting wind energy as pro-environmental or as financially attractive. It was explained to participants in both conditions that they can invest in a share of a windmill for five years. The participants in the environmental condition received the information that investing in windmill shares increases the production of renewable energy, which implies that less nuclear and coal energy is needed that both have a negative environmental impact. Hence, by investing in windmill shares they contribute to a better environment. Participants in the financial condition received the message that if they invest in windmill shares, the energy that their windmill produces will be deducted from their energy bill, which will result in costs savings. Furthermore, a picture was included to strengthen the environmental or financial message (see Figure 9).

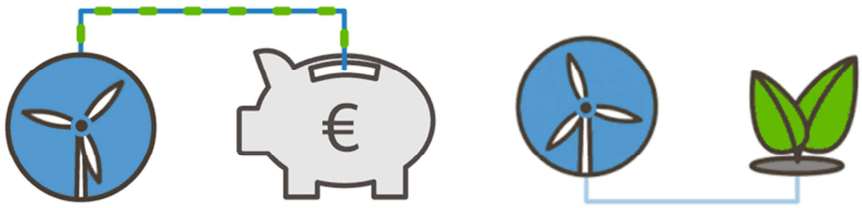

Figure 9: The picture on the left was shown with the financial message, the picture on the right was shown with the environmental message

5.2.2 Measures

We again measured the extent to which participants think Qurrent aims to reduce its environmental impact (CER). We included three items to measure CER: I think Qurrent aims to reduce its environmental impact; I think Qurrent has policies and procedures to minimize its environmental impact; I think Qurrent included in its mission to minimize its environmental impact. Participants could answer on a scale ranging from 1 (totally disagree) to 7 (totally agree). The items formed a reliable scale (Cronbach's alpha = .96; *Mean* = 5.05, *Standard deviation* = 1.42).

We measured the intention of participants to invest in wind energy shares (I am inclined to invest in wind energy shares) on a scale from 1 (not at all inclined) to 7 (very much inclined); mean score was 3.13, Standard deviation = 1.67.

We asked people how much money they want to save on their yearly energy bill before they would consider investing in shares in wind energy. They could answer on a scale from 0 euros to 250 euros (*Mean* = 139, *Standard deviation* = 70).

We also asked participants to leave their email address if they would like to receive more information about shares in wind energy; 89 participants filled in their email address while 210 did not.

6. Results Study 2

We first tested which of the two messages was more effective in enhancing the intention to invest in wind energy shares. We found no differences between the two groups in the intention to invest in wind energy shares ($t(290) = -1.08$, $p = .28$), the amount of money they want to save ($t(252) = -1.07$, $p = .29$) and whether they would like to receive more information ($\chi^2(1) = .00$, $p = .99$; see Figure 10, 11 and 12).

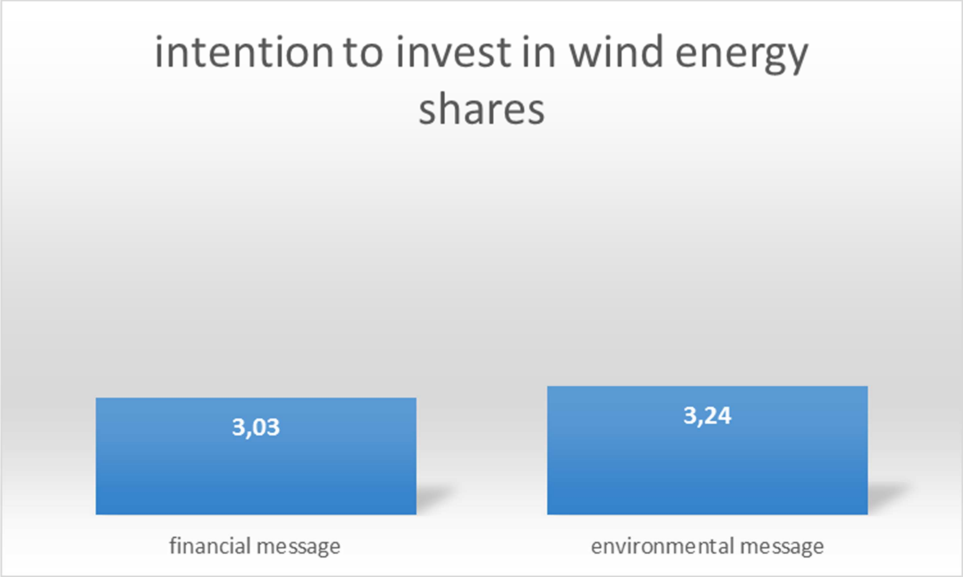

Figure 10: Intention to invest in wind energy shares, for the environmental and financial message on a scale from 1 to 7.

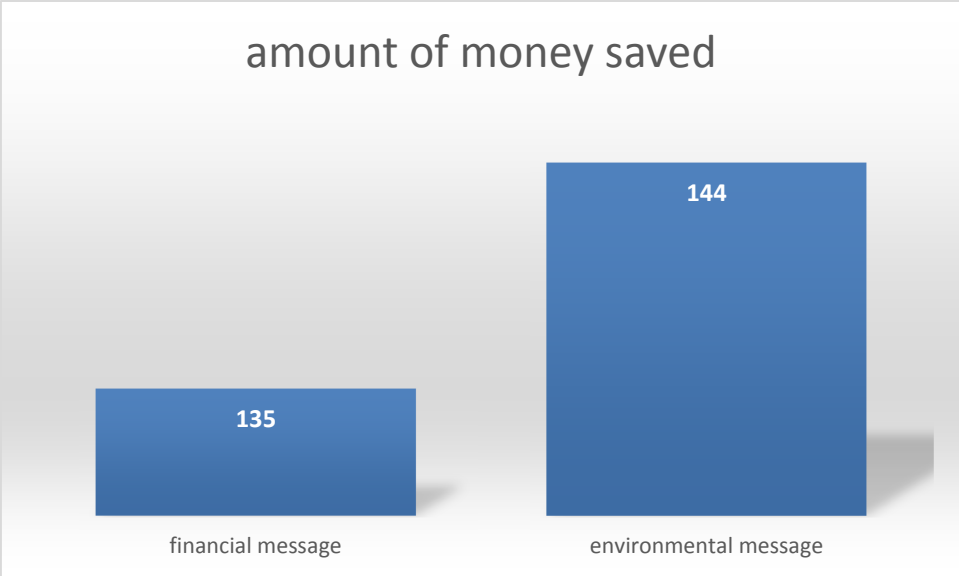

Figure 11: The amount of money that participants yearly want to save when investing in wind energy shares in euros, for the environmental and financial message.

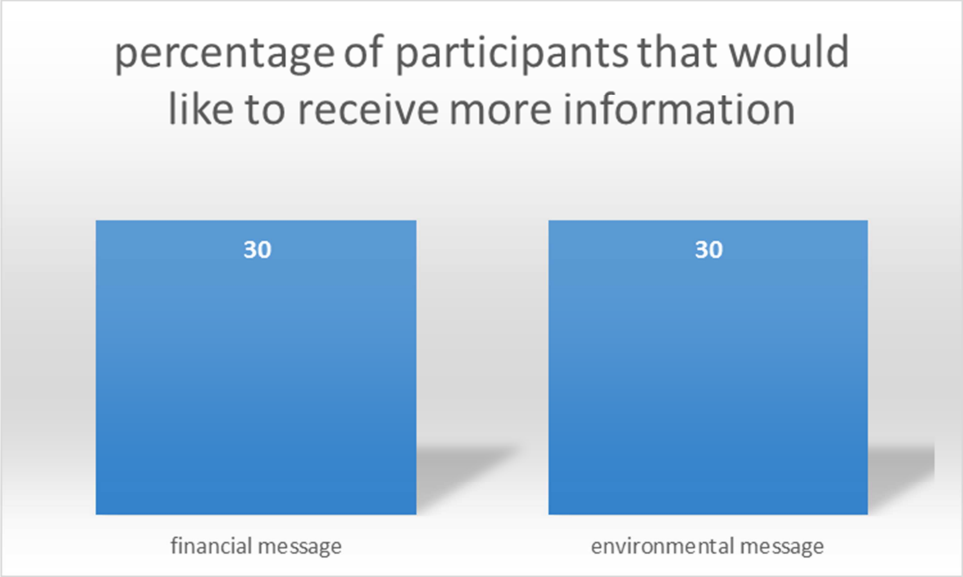

Figure 12: The percentage of participants wanting to receive more information on wind energy shares, for the environmental and financial message.

Next, we tested the influence of the type of message, the extent to which participants think the utility aims to reduce its environmental impact and their interaction on the variables focussing on investing in wind energy. The variables explained 5% of the variance in the intention to invest in wind energy shares ($F(3, 287) = 5.25$, $p < .01$). The more one thinks the utility aims to reduce its environmental impact, the stronger one's intention to invest in wind energy shares ($b = .23$, $p < .01$). The message did not influence the intention to invest in wind energy shares ($b = .13$, $p = .49$). However, we found an interaction between the message type and the extent to which participants think the utility aims to reduce its environmental impact ($b = .34$, $p < .05$). When people think the utility does not strongly aim to reduce its environmental impact ($M < 1.78$), the financial message is more effective in promoting investment in wind energy shares than the environmental message. However, when participants strongly think the utility aims to reduce its environmental impact ($M > 6.01$), the environmental message is more effective in promoting investment in wind energy shares, see Figure 13.

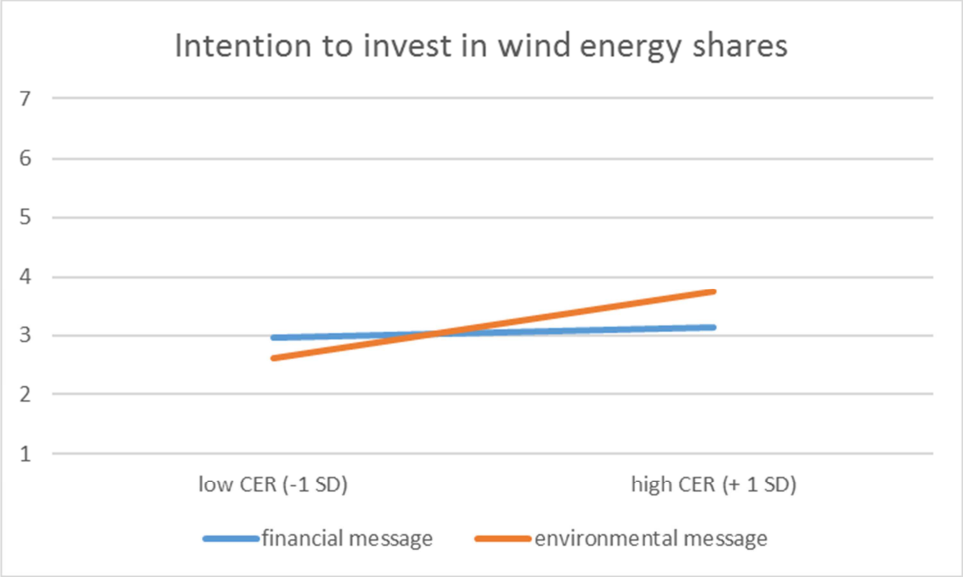

Figure 13: The interaction between the message and the extent to which participants think their utility reduces its environmental impact.

The message, the extent to which people think their utility aims to reduce its environmental impact and their interaction did not influence the amount of money people want to save before they invest in wind energy shares ($F(3, 247) = 1.23$, $p = .30$).

The message, the extent to which people think their utility aims to reduce its environmental impact and their interaction explained 3% of the variance of whether people want to receive more information on investing in wind energy shares ($\chi^2(3) = 8.22$, $p < .05$). The more one thinks the utility aims to reduce its environmental impact, the more likely it is that one wants more information on investing in wind energy shares ($b = .23$, $p < .05$). The message did not influence the intention to invest ($b = -.13$, $p = .63$). However, we again found an interaction between the message and the extent to which participants think the utility aims to reduce its environmental impact ($b = .45$, $p < .05$). When people think the utility does not strongly aim to reduce its environmental impact ($M < 2.69$), the financial message is more effective in promoting investment in wind energy shares than the environmental message. In other cases there is no effect of the message on whether people want to receive more information, see Figure 14.

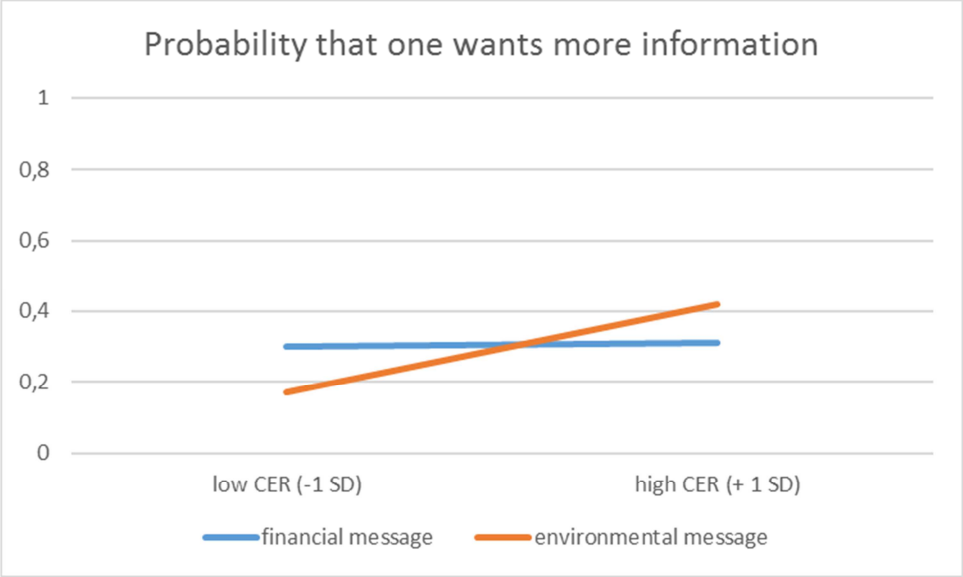

Figure 14: The interaction between the message and the extent to which participants think their utility reduces its environmental impact.

Overall, our findings show that the extent to which people think their utility aims to reduce its environmental impact influences investment in wind energy production shares. Interestingly, the extent to which people think their utility aims to reduce their environmental impact is likely to influence which type of message is most effective in promoting sustainable energy behaviour. Our results suggest that when organizations are perceived as aiming to reduce their environmental impact an environmental message is more likely to effectively promote sustainable energy behaviour. However, when people think the organization does not aim to reduce its environmental impact an environmental message is not effective. In that case, a different message such as a financial message may be more effective in promoting sustainable energy behaviour.

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