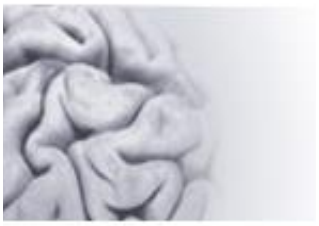
Universiteit Leiden

Faculteit der Sociale Wetenschappen



The acceptance of direct current (DC) electricity in Dutch households

The influence of framing and social proof on the acceptance of a DC house

Harm de Been

in collaboration with Rosa Poell

Master thesis Psychology, specialization Economics and Consumer Psychology

Institute of Psychology

Faculty of Social and Behavioral Sciences – Leiden University

Date: 13-6-2016

Student number: 1751999

First examiner of the university: Emma ter Mors

Second examiner of the university: Wilco van Dijk

External supervisor: Laura Ramirez and Laurens Mackay (TU Delft)

ABSTRACT

The last few decades there is a growing need for sustainable behavior to decrease the fossil fuel dependency and greenhouse gas emissions. Many institutes have been formed to focus their time and efforts on sustainable solutions. As such, a direct current (DC) house has been developed by the Technical University Delft. This house is fully functional on direct current electricity, able to save energy, and make lives easier. However, little is known about the consumer acceptance towards DC houses. Assuming that consumers are driven by a need to stay close to the alternating current (AC) status quo, and therefore negatively influencing their attitude towards DC, we set out to investigate the effect of framing and social proof on attitude towards the DC house and its components and intention to purchase the DC house. This study (N = 139) examined how framing a communication about a DC house in terms of gain or loss outcomes, and the presence or absence of social proof, can affect consumers' attitude towards the DC house and their intention to purchase the DC house. We hypothesized that gain framed information and the presence of social proof would lead to a more positive attitude towards the DC house and higher intention to purchase the DC house, than loss framed information and the absence of social proof. The results showed no difference between gain framed and loss framed communications, nor between the presence and absence of social proof, on attitude towards the DC house and intention to purchase the DC house. However, further investigations of the results demonstrated that the participants had a very positive attitude towards the DC house and a high intention to purchase the DC house. In addition, positive attitudes towards sustainability might play a key role in the acceptance of DC houses in the near future. To conclude, practical implications regarding the acceptance of DC are outlined and the limitations of the study are discussed.

INTRODUCTION

Since the signing of the United Nations Framework Convention on Climate Change (UNFCCC) by the entire United Nations group in 1992 the need for new and innovative ways to decrease greenhouse gas emissions has greatly increased. The objective of the UNFCCC was the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" (United Nations, 1992, p. 9). The Dutch government spends more than 1 billion euro per year on mitigating climate change (CBS, 2012). The energy sector is the sector in which huge steps can be made towards realizing this goal. Currently, the greater part of the used energy is produced by using fossil fuels such as oil, gas, and coal. The main problem with these types of fuels is that they are not endless, and many scientist have predicted that the worlds' oil and gas reserves will run out in the next hundred years. Therefore a transition from the use of fossil fuels towards more renewable energy sources, such as solar-, wind-, and hydropower, is needed. The key reasons for this transition are the increasing global demand to lower the greenhouse gas emissions and to lower the fossil fuel dependency (Huberty & Zysman, 2010).

Knowing this, several research institutes and businesses have decided to primarily focus on researching innovative and clean ways to produce and apply energy. Relevant for the present research is, that by harnessing the power of the elements, such as the sun and the wind, direct current (DC) electricity is produced. DC is a form of electric current first used in appliances by Thomas Edison in the late nineteenth century, and is characterized by the fact that the electric current is at a constant level. The counterpart of DC electricity is alternating current (AC). AC is characterized by the fact that the electric current is alternating through time, with high and low peaks (Bhargava & Kulshreshtha, 1984). Households in the Netherlands use an AC electricity system. This is because, when both systems where first developed, AC electric systems outperformed DC electric systems. AC electric systems were considered to be safer, and would cost less to apply. Therefore infrastructures were created throughout the Netherlands based on the appliance of AC. However this was true in the previous century, and through time technologies have advanced rapidly.

Research by Technical University of Delft and other companies suggests that these days a direct current (DC) electricity system would be more efficient than an AC electricity system (Mackay, 2015). A DC electric system is not considered to be dangerous anymore, and it could easily be integrated in houses, and most importantly DC electric systems are able to save energy compared to the current AC electric systems (Pang, Lo & Pong, 2006). Research

by Pang et al. (2006) indicates that early models of the DC system save energy ranging from 9,5 % in residential buildings to 18,7 % in school buildings. This energy saving takes place because a lot of household appliances need DC in order to work. To transform the AC output to DC, external and internal adapters are used. These adapters use energy to transform the electric current from AC to DC. A good example of this energy usage is when you take a closer look at your external laptop adapter. The electrical socket provides AC and your laptop needs DC in order to work; the adapter has the function of a transformer. Whenever the laptop is turned on, the adapter will become warmer. All this heat is energy escaping and not being used to its full potential. By changing the socket output from AC to DC this process would be eliminated, and therefore energy will be saved. Additionally, the transformer will become smaller, or even disappear in its entirety, and materials will be saved.

In response to these developments the Technical University Delft in the Netherlands started to design a house with a complete DC electricity system incorporated. The main components of these houses are solar panels, a heat pump, a battery unit to store excess energy, USB-electrical sockets, and a charging point for electric vehicles. While designing this 'DC house' the Technical University of Delft posed the question on the factors that may affect the acceptance of DC houses by consumers. Currently little is known about how consumers respond to this new DC house, and its applications. The need for research to consumer acceptance of the DC house is great because when facing the introduction of a new product and the acceptance of an innovative good, the consumer is the most important factor to consider. It is of utmost importance to know the needs and wants of a customer when designing a product, especially when the product is unknown to consumers. When aiming to get a high acceptance rate by consumers the benefits of a product and its position against the competitive background should be stated (Dunphy & Herbig, 1995). Therefore insight in the motivations and needs of consumers regarding an electric system and specifically the DC house can help the energy sector to drive this new piece of technology in consumers' homes. The current experimental study will aim to gain insight in some of the factors concerning the acceptance of the DC house by consumers. And furthermore which factors would persuade people to switch from the current AC house to the new DC house. In doing so, we will focus in the present research on factors influencing the acceptance of a DC house.

Changing from the current AC houseto the newer DC house can be a costly affair for a person both economically and psychologically (Polites & Karhanna, 2012). In the case of the DC electric system there are two options to consider happening when applying the DC electric system to houses. The first option is that an existing houses electric infrastructure is

changed from AC to DC. This is not as simple as flicking a switch and the current changes. The entire building electric infrastructure has to be replaced. The second option is that a new house is built with the DC electric system incorporated from the start. The focus in the present research will be on this second situation. In both situations there is a need for a financial investment from the consumers' part, and a DC houses' initial purchase costs are expected to be higher than the AC alternative. These increased costs are due to the fact that it is a new product needs a lot of initial investments to get the DC housing market going. However, the DC house also saves money on the long run due to the fact that the DC electric system wastes less energy, and also produces energy through the use of solar panels, therefore the consumer should have lower energy bills. This means that the consumer has to decide whether he or she finds the transition to DC worth the extra money, and there will be an interplay between a consumers' current budget and willingness to wait for the investment to return.

The psychological factors to consider when making the transition from an AC house to a DC house are that house owners will have to get used to an entirely new system. Habits of house owners might have to change, for example in a DC house the familiar electric sockets will be replaced by USB-sockets and require different cables than people are used to. This need for changes in habits could make it less likely that people make the transition from the current AC house to a DC house. People have a desire to feel in control and determine their own situation (Kim & Kankanhalli, 2009). By requiring people to change existing habits they might lose this feeling of control and feel uncertain which lowers the chance of transitioning to a DC house and DC acceptance more in general. The desire to feel in control might also result in a status quo bias, since individuals do not want to lose control by switching to an unknown system or unfamiliar way of working (Kim & Kankanhalli, 2009). Status quo bias is described as doing nothing or maintaining one's current or previous decision. This bias may be the result of rational decision making, whereby the individual takes into account the costs (real or perceived) of switching from status quo to a new position, and choose not to switch (Polites & Karhanna, 2012). This desire to feel in control likely creates a psychological commitment to the existing AC house, and could increase peoples' beliefs in the effectiveness of the existing system by rationally focusing on the downsides of the DC house. We expect that people may be reluctant to accept the DC house and its components because of the existing status quo involving the AC houses. House owners may think that they are well-settled with their current housing situation because everything is working fine, therefore creating a status quo bias.

In the case of a deep rooted status quo bias in favor of the current AC houses. It could

be quite challenging to persuade people to make the transition from the AC house to the DC house. As such, it is important to examine what drives the status quo bias in general and in the context of the transition to a DC house. Prospect theory by Kahneman (1979) is relevant in this regard. Prospect theory states that people do not make decisions using logical decision making, and utility-maximization, but rather make choices in a predictable irrational manner (Kahneman & Tversky, 1979). Research by Hartman, Doane and Woo (1991) found that there is a link between prospect theory and status quo in that people attach a great value to maintain the status quo. People constantly engage in an inherent cost analysis; weighing the potential gains against losses. Kahneman's (1977) prospect theory further suggests that people have the tendency to isolate a choice problem in terms of gains and losses under uncertainty. People also count losses as more significant than gains. In the case of maintaining the status quo people might weigh the deviation from the status quo as a loss, and thus are less willing to accept new systems.

When looking at the notion made by Kahneman and Tversky (1984) that 'Losses loom larger than gains', one could argue that when change is communicated with the focus on what can be gained through this change people would take less notice of the losses. In line with the notion that 'losses loom larger than gains', is the statement that people are generally risk-averse. That is, when people experience uncertainty regarding outcomes of their decision they tend to let a possible loss weigh heavier than a possible gain (Kahneman & Tversky, 1984). This would align with the fact that people are reluctant to get away from the status quo. At the same time, Tsur, Sternberg, and Hochman (2016) argue that risk aversion does not necessarily always occur and play a significant negative role in the acceptance of innovative goods, but rather the opposite. They found that risk aversion could play a significant positive role in the acceptance of innovative goods when the consumer has the feeling he or she is missing out on something if he does not make the transition. Spence and Pidgeon (2010) found that the way in which communications about changes are framed have a substantial impact on the way they are processed by a person. Drawing from the prospect theory literature they designed two separate information frames which either focused on the positive consequences (gains) of undertaking a particular behavior; or focused on the negative consequences (losses) of undertaking a particular behavior. Gain framed information was found to be more effective in promoting positive attitudes towards change than loss framed information. We argue that the same effect could be found for the acceptance of a DC house. When a DC house and its components are communicated using a gain frame it might be more effective in eliciting positive attitudes towards the DC house than when it is communicated using a loss frame. The

uses of a gain frame could also result in a feeling of not wanting to miss out on the product, and also in this way could increase the consumers' willingness to make the transition from the AC to the DC house.

It should be noted that simply putting communicating using a gain frame alone does not automatically lead to a positive attitude towards the DC house Kim and Kankanhall (2009) indicate that the perceived value of a new product should be emphasized from the viewpoint of the user. Switching benefits, therefore, need to be communicated clearly to users before the new product release. By doing this you can lower the feeling of uncertainty created by a new product. When people are fully aware of the implications of a new product it might lift the barrier of uncertainty (Polites & Karahanna, 2012), which in turn may increase the acceptance of the DC house.

Another mean of influencing peoples' attitude towards a product, besides the use of gain/loss frames in communication, is through informational social influence, also called social proof. Social proof is a way that individuals determine appropriate behavior for themselves by examining the behavior of others. It is through social comparison with referent others that people validate the correctness of their opinions and decisions (Cialdini, 1984). An example of social proof nowadays would be the use of online forums regarding products. Whenever someone wants to buy a product, he or she goes to the forum and reads reviews written by other people related to that product. Since the person who is planning on buying the product is not an expert on the product, otherwise he or she would not be on that forum, the potential buyer accepts the opinion of the other people more easily. When someone writes a positive review, the potential buyer is more positive about the product, and when someone writes a negative review, the potential buyer is less positive about the product. The same could apply for a DC house. If a group of people reviewed the DC house and its components positively it should then lead to a more positive attitude towards the DC house and its components. Important to note here is that the social proof phenomenon is stronger when the person that wrote the review is similar to the person reading the review (Malhotra & Galletta, 1999). Malhotra and Galletta (1999) showed that social influence plays an important role in the acceptance and usage behavior of people regarding new technologies. Whenever social influence generates a feeling of internalization and identification on the part of the user, it has a more positive influence on the attitude and intention to purchase of the new product. When focusing on identification on the part of the user this could mean that the user identifies with another person who is using the product. When applied to the DC house this means that a review written by people who are most similar to the reader should have more positive (or

negative) influence on attitudes towards the house.

In the current experimental research information about a fully functional newly build DC house will be offered to the participants. The participants will be told to imagine that they have a fixed budget and that the price of the DC house fits within this budget. The goal of this imagination task is to cancel out the influence of any economic considerations that a participant has in real life. The participants will be informed about direct current and all the components related to the house. These components are solar panels, a heat pump, a battery unit to store excess energy, USB-electrical sockets, and a charging point for electric vehicles. The information will be provided in either a gain or loss focused communication frame and social proof will be present or absent. Following the scenarios with the manipulations the participants will be asked to fill in a questionnaire based on the literature of Yazdanpanah and Forouzani (2015). They created a questionnaire which applied the theory of planned behavior (TPB) (Ajzen, 1991) to predict the purchasing behavior of students. In the current study two constructs were chosen from their questionnaire, namely attitude and intention to purchase. These were chosen due to the fact that they found a strong positive relationship between attitude and intention to purchase. Meaning in this research that a positive attitude towards the DC house could predict a high intention to purchase the DC house. Knowing this information is relevant for future marketing policies.

Our literature review led to the following hypotheses:

Hypothesis 1a: A gain framed communication about the DC house will result in a more positive attitude towards the DC house than a loss framed communication;

Hypothesis 1b: A gain framed communication about the DC house will result in a higher intention to purchase the DC house than a loss framed communication.

Hypothesis 2a: The inclusion of social proof in a communication will lead to a more positive attitude towards the DC house than a communication with no social proof included;

Hypothesis 2b: The inclusion of social proof in a communication will lead to a higher intention to purchase the DC house than a communication with no social proof included.

METHOD

Particpants and design

A total of 144 participants (65 male, 78 female, and 1 other: the participant that filled in 'other' ticked this box, but did not fill in anything else in that box) were recruited at various locations in the Netherlands. The age of the participants ranged from 18 to 75 years old, with an average (M) age of 40.59 years old and standard deviation (SD) of 15.93. The participants' educational levels varied from having completed primary school to have obtained a Master degree. Participants were randomly assigned to one of four conditions in a 2 (Frame: Gain frame vs. Loss frame) x 2 (Social proof: Social proof present vs. Social proof absent) between-subjects design.

Procedure

The data were collected in public areas such as public libraries and office buildings. These locations were chosen because of their calm nature. People in these locations have the tendency to spend more time on filling in the questionnaire; this was important since the questionnaire would take about 15 minutes to fill in. The experiment started with the signing of an informed consent (see Appendix A). Then, participants were randomly assigned to one of four conditions. For every condition a separate scenario had been developed (see Appendix B). The first part of every scenario was identical for all experimental conditions, while the second part differed between experimental conditions.

In the first part participants were asked to imagine a situation where they are considering buying a house. They read that they had a budget of 380.000 euro and heard about a special housing project in the Dutch province of North Holland. The houses in this project have a DC electricity infrastructure. The difference between AC and DC was explained, and the components of a DC house were shown. The DC house included next to DC electricity solar panels, a heat pump, a battery unit to store excess energy, USB-electrical sockets, and a charging point for electric vehicles. This was the main set-up of the scenarios after which the manipulations followed. In all experimental conditions participants were presented with a picture of the DC house and its price (€365.000), and living surface (160 m^2 – 5 rooms). The costs of this house were within the participants' budget. Underneath the picture of the DC house four characteristics were summarized. The way they were framed

depended on the experimental condition. The gain and loss frame manipulation was implemented by describing the gains or losses for the participant in comparison to their current situation. For example participants in the gain frame read: “USB-electrical sockets are included in the house which emit both electricity and internet”, while participants in the loss frame read: “The old electrical sockets will be replaced by USB-electrical sockets which emit both electricity and internet.” As the experiment was conducted in Dutch, these examples are translations.

Next, the social proof manipulation followed. The social proof manipulation was either present or absent depending on the assigned condition. The manipulation consisted of a small paragraph which described a situation in which a ‘Test DC house’ was created by the TU Delft, and had been tested by a number of reviewers for a month. These reviewers rated the house above average with an 8.6 on a 10-point scale. These reviewers act as people with which the participants can identify, and therefore creating a feeling of social proof.

After the participants read the scenarios, they were asked to fill in a questionnaire (see Appendix C). This questionnaire consisted of questions about the participants’ attitude towards the DC house and its separate components (solar panels, a heat pump, a battery unit to store excess energy, USB-electrical sockets, and a charging point for electric vehicles), and their intention to purchase the house. Questions regarding living surface preferences and price acceptability were also asked. Next, the participants were debriefed (see Appendix D) and thanked for their participation. As a sign of appreciation they could participate in a lottery for a 10 euro voucher (VVV bonnen) and sign up to get an update about the results of this research.

Measures

Attitude towards the DC house: We used three attitude items based on the items used in the research by Yazdanpanah and Forouzani (2015) to measure the dependent variable ‘attitude towards the DC house’. The questions related to this construct were: ”I think the DC house is interesting”, “The DC house appeals to me”, and “I think the DC house is attractive”. (1 = completely disagree, 5 = completely agree). A sufficient Cronbach’s Alpha was found for attitude towards the DC house ($\alpha = .87$).

Intention to purchase the DC house: We used three purchase intention items based on the items used in the research of Yazdanpanah and Forouzani (2015) to measure the dependent variable ‘intention to purchase the DC house’. The questions related to this construct were: ”I am willing to purchase the DC house”, “I would consider purchasing the

DC house", and "I would like to live in the DC house". (1 = completely disagree, 5 = completely agree). A sufficient Cronbach's Alpha was found for intention to purchase the DC house (α = .93).

Attitude towards DC electricity: We used six attitude items based on the items used in the research of Yazdanpanah and Forouzani (2015) to measure the dependent variable 'attitude towards DC electricity'. The questions related to this construct were: "I think it is interesting that the house has an energy provision based on direct current electricity", "I think it is an important advantage that the house has an energy provision based on direct current electricity", "I have faith in the adequate use of the energy provision based on direct current electricity", "I think it is comforting to know that the house has an energy provision based on direct current electricity", "The fact that the house has an energy provision based on direct current electricity alarms me/ makes me feel uncomfortable", and "I think it is sensible to choose for a house with an energy provision based on DC electricity". (1 = completely disagree, 5 = completely agree). A sufficient Cronbach's Alpha was found for attitude towards DC electricity (α = .81).

Attitude towards solar panels: We used three attitude items based on the items used in the research of Yazdanpanah and Forouzani (2015) to measure the dependent variable 'attitude towards solar panels'. The questions related to this construct were: "I think it is interesting that the house has solar panels on the roof", "I think it is important that the house has solar panels on the roof", and "I think it is an important advantage that the house has solar panels on the roof". (1 = completely disagree, 5 = completely agree). A sufficient Cronbach's Alpha was found for attitude towards solar panels (α = .88).

Attitude towards the battery unit: We used three attitude items based on the items used in the research of Yazdanpanah and Forouzani (2015) to measure the dependent variable 'attitude towards the battery unit'. The questions related to this construct were: "I think it is interesting that the acquired electricity will be stored in batteries in the house", "I think it is important that the acquired electricity will be stored in batteries in the house", and "I think it is an important advantage that the acquired electricity is stored in batteries in the house". (1 = completely disagree, 5 = completely agree). A sufficient Cronbach's Alpha was found for attitude towards the battery unit (α = .92).

Attitude towards the charging point for electric vehicles: We used three attitude items based on the items used in the research of Yazdanpanah and Forouzani (2015) to measure the dependent variable 'attitude towards the charging point for electric vehicles'. The questions related to this construct were: "I think it is interesting that the house has a charging point for

electric vehicles", "I think it is interesting that the house has a charging point for electric vehicles", and "I think it is an important advantage that the house has a charging point for electric vehicles". (1 = completely disagree, 5 = completely agree). A sufficient Cronbach's Alpha was found for attitude towards charging point for electric vehicles (α = .92).

Attitude towards the heat pump: We used three attitude items based on the items used in the research of Yazdanpanah and Forouzani (2015) to measure the dependent variable 'attitude towards the heat pump. The questions related to this construct were: "I think it is interesting that the house has a heat pump", "I think it is important that the house has a heat pump", and "I think it is an important advantage that the house has a heat pump". (1 = completely disagree, 5 = completely agree). A sufficient Cronbach's Alpha was found for attitude towards the heat pump (α = .89).

Attitude towards the USB-electric sockets: We used three attitude items based on the items used in the research of Yazdanpanah and Forouzani (2015) to measure the dependent variable 'attitude towards the USB-electric sockets'. The questions related to this construct were: "I think it is interesting that the house has USB-electrical sockets", "I think it is important that the house has USB-electrical sockets", and "I think it is an important advantage that the house has USB-electrical sockets". (1 = completely disagree, 5 = completely agree). A sufficient Cronbach's Alpha was found for attitude towards the USB-electric sockets (α = .87).

Price acceptability: control variable, consisting of 1 item, created to check for possible biases towards the proposed asking price. The question was: "The asking price of the house is acceptable" (1 = completely disagree, 5 = completely agree).

Living surface: control variable, consisting of 1 item, created to check for possible biases towards the houses living surface. The question was: "The living surface of the house is in agreement with my living demands" (1 = completely disagree, 5 = completely agree).

RESULTS

We examined how our participants evaluated the DC house and whether they were willing to purchase the house by means of an Analysis of Variance (ANOVA) on the two main dependent variable attitude towards the DC house and intention to purchase the DC house variables with frame and social proof as our independent variables.

Before any analyses were conducted the data sample was checked for abnormalities in

values; being either missing values or other abnormalities. From the check four participants came up which had a high number of missing values on the main dependent variables attitude towards the DC house and intention to purchase the DC house, and one who had a high number of missing values on the dependent variable attitude towards the heat pump. After careful consideration we decided that these five participants would be excluded from the analyses reported below. The sample size used for the analyses consisted of 139 participants (63 men and 76 women). The age distribution was still between 18 and 75 years old with an average (M) age of 40.23 and standard deviation (SD) of 15.70.

To check for outliers ($SD > 3$) we conducted a case summary research on the data sample. In total nine outliers were found on the two main dependent variables (attitude towards the DC house and intention to purchase the DC house). To double check we computed the Cook's Distance for the dependent variables to determine if the cases influenced the results significantly. The highest Cook's Distance found was 0.08 which was a lot lower than the threshold of 1 on which Cook's Distance states that a case is an outlier. Therefore we concluded that that the nine cases would not be excluded from the sample. Before the main analysis was conducted the assumptions of the Analysis of Variance (ANOVA) were checked. These assumptions were normality, independence of error variance, and independence of observations. None of these assumptions had been violated; for an in-depth analysis see Appendix E.

Main analysis

To test the hypotheses an Analysis of Variance (ANOVA) was conducted. The dependent variables were attitude towards the DC house and intention to purchase the DC house. The results are shown in Table 1. Table 2 presents the means and standard deviations for attitude towards the DC house and intention to purchase the DC house as a function of the experimental conditions.

Table 1: Results of the ANOVA for attitude towards the DC house and intention to purchase the DC house.

	F	**df**	***p***	**Part. η^2**
Attitude towards the DC house				
Frame	0.00	1, 135	.994	.00
Social Proof	0.03	1, 135	.869	.00
Frame x Social Proof	0.14	1, 135	.709	.00
Intention to purchase the DC house				
Frame	0.07	1, 135	.788	.00
Social Proof	0.01	1, 135	.927	.00
Frame x Social Proof	0.43	1, 135	.512	.00

The first hypothesis (1a) "A gain framed communication about the DC house will result in a more positive attitude towards the DC house than a loss framed communication" was not supported by the data. The participants did not show a more positive attitude towards the DC house in a gain framed communication (M = 3.94, SD = 0.95) compared to the loss framed communication (M = 3.93, SD = 0.77). The second frame hypothesis (1b) "A gain framed communication about the DC house will result in a higher intention to purchase the DC house than a loss framed communication" was not supported by the data either. Participants did not show a higher intention to purchase the DC house in the gain framed communication (M = 3.45, SD = 1.10) compared to the loss framed communication (M = 3.40, SD = 1.16).

The second hypothesis (2a) "The inclusion of social proof in a communication will lead to a more positive attitude towards the DC house than a communication with no social proof included" was not supported by the data. The participants did not show a more positive attitude towards the DC system when social proof was present (M = 3.95, SD = 0.91) than when it was absent (M = 3.93, SD = 0.83). The second social proof hypothesis (2b) "The inclusion of social proof in a communication will lead to a higher intention to purchase the DC house than a communication with no social proof included" was not supported by the data either. The participants did not show a higher intention to purchase the DC system when social proof was present (M = 3.44, SD = 1.15) than when it was absent (M = 3.41, SD = 1.12).

Table 2: Means and standard deviations for attitude towards the DC house and intention to purchase the DC house as a function of the experimental conditions.

	Experimental condition			
Dependent variables	Gain frame + Social proof present	Gain frame + Social proof absent	Loss frame + Social proof present	Loss frame + Social proof absent
Attitude towards the DC house	3.92 (1.09)	3.95 (0.81)	3.98 (0.68)	3.90 (0.86)
Intention to purchase the DC house	3.52 (1.19)	3.38 (1.19)	3.34 (1.12)	3.45 (1.21)

No significant interaction effect was found for Frame and Social proof on attitude towards the DC house or intention to purchase the DC house.

To test whether Frame and Social proof affected the remaining dependent variables an ANOVA was conducted. The remaining dependent variables are: attitude towards DC

electricity, attitude towards solar panels, attitude towards the battery unit, attitude towards the charging point for electric vehicles, attitude towards the heat pump, attitude towards USB-electric sockets, price acceptability, and living surface. The results are shown in Table 3. Table 4 presents the means and standard deviations for the remaining dependent variables as a function of the experimental conditions.

Table 3: Results of the ANOVA for the remaining dependent variables as a function of the experimental conditions

	F	**df**	***p***	**Part. η^2**
Attitude DC electricity				
Frame	0.34	1, 135	.562	.00
Social proof	0.02	1, 135	.885	.00
Frame x Social Proof	0.07	1, 135	.792	.00
Attitude solar panels				
Frame	0.08	1, 135	.782	.00
Social proof	0.22	1, 135	.637	.00
Frame x Social Proof	0.46	1, 135	.831	.00
Attitude battery unit				
Frame	2.29	1, 135	.132	.02
Social proof	1.40	1, 135	.239	.00
Frame x Social Proof	0.31	1, 135	.578	.00
Attitude charging point for electric vehicles				
Frame	1.27	1, 135	.262	.01
Social proof	0.00	1, 135	.953	.01
Frame x Social Proof	1.63	1, 135	.204	.01
Attitude heat pump				
Frame	0.22	1, 135	.643	.00
Social proof	0.00	1, 135	.978	.00
Frame x Social Proof	0.00	1, 135	.982	.00
Attitude USB-electric sockets				
Frame	0.12	1, 135	.728	.00
Social proof	0.43	1, 135	.516	.00
Frame x Social Proof	0.00	1, 135	.962	.00
Price acceptability				
Frame	0.00	1, 135	.995	.00
Social proof	0.01	1, 135	.911	.00
Frame x Social Proof	0.54	1, 135	.462	.00
Living surface				
Frame	0.57	1, 135	.452	.00
Social proof	0.59	1, 135	.444	.00
Frame x Social Proof	0.24	1, 135	.623	.00

No significant main effect of frame, social proof or interaction effect was found on any of the dependent variables. We do note that the means (see Table 4) for both experimental conditions are high. Meaning that people regardless of their experimental condition had a positive attitude towards all the separate components of the DC house. The data also show that participants have a particular liking towards solar panels with attitude towards solar

panels having the highest mean. This might be because solar panels are quite common in the Dutch society, and thus people are more familiar with them. We will discuss this more in depth in the discussion.

Table 4: Distribution of the means and standard deviations for the remaining dependent variables as a function of the experimental conditions.

	Experimental condition			
Dependent variables	Gain Frame + Social Proof present	Gain Frame + Social Proof absent	Loss Frame + Social Proof present	Loss Frame + Social Proof absent
Attitude DC electricity	3.53 (0.54)	3.52 (0.58)	3.55 (0.45)	3.58 (0.65)
Attitude solar panels	4.15 (0.85)	4.19 (0.67)	4.16 (0.94)	4.26 (0.89)
Attitude battery unit	3.72 (1.02)	3.82 (0.94)	3.87 (0.81)	4.14 (0.82)
Attitude charging point for electric vehicles	3.49 (1.13)	3.70 (0.96)	3.91 (1.02)	3.67 (1.08)
Attitude heat pump	3.85 (0.84)	3.85 (0.76)	3.79 (0.82)	3.78 (0.92)
Attitude USB-electric sockets	3.80 (0.96)	3.68 (1.02)	3.85 (0.91)	3.75 (0.97)
Price acceptability	3.74 (1.09)	3.59 (1.01)	3.61 (1.09)	3.72 (0.91)
Living surface	3.57 (1.31)	3.51 (1.15)	3.52 (1.18)	3.25 (1.32)

Additional analyses

Even though the hypotheses were not supported by the data, the data does show that people have more positive attitude towards the DC house than beforehand expected. On a five point Likert scale the mean of attitude towards the DC house was close to 4; and the mean of intention to purchase the DC house close to 3.5. This raises the question of which component(s) of the house related may have predicted this favorable attitude and high purchase intention.

We first conducted a correlational analysis (see Table 5). The results for this analysis showed that the attitude towards all the different components of the DC house have a significant and positive relation with the two main dependent variables. Attitude towards direct current had the highest correlation with both ‘attitude towards the DC house’ (r = .58) and ‘intention to purchase the DC house’ (r = .53). Meaning that the more favorable the opinion of a person towards DC was, the more favorable the persons’ opinion towards the DC house was and the higher the persons’ intention to purchase the DC house was.

Table 5: Mean (M) and standard deviation per dependent variable and zero-order correlations.

Descriptives			Correlations									
Variable	**M**	**SD**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1. Attitude DC house	3.94	0.87	-	.81**	.58**	.44**	.36**	.38**	.42**	.31**	.37**	.41**
2. Intention to purchase DC house	3.43	1.13	-	-	.53**	34**	.31**	.29**	.37**	.29**	.47**	.52**
3. Attitude DC electricity	3.76	0.71	-	-	-	.52**	.50**	.47**	.52**	.42**	.30**	.21*
4. Attitude solar panels	4.19	0.83	-	-	-	-	.53**	.50**	.58**	.42**	.26**	.20*
5. Attitude battery unit	3.89	0.90	-	-	-	-	-	.30**	.49**	.43**	.17	.16
6. Attitude charging point electric vehicles	3.69	1.05	-	-	-	-	-	-	.41**	.47**	.20*	.11
7. Attitude heat pump	3.81	0.83	-	-	-	-	-	-	-	.47**	.18*	.15
8. Attitude USB-electric sockets	3.77	0.96	-	-	-	-	-	-	-	-	.17*	.11
9. Price acceptability	3.67	1.02	-	-	-	-	-	-	-	-	-	.40**
10. Living surface	3.46	1.23	-	-	-	-	-	-	-	-	-	-

* Significance at 0.05 level; ** significance at 0.01 level

This might be due to the fact that in the scenarios DC electricity was explained more thoroughly, and thus became more salient, compared to the other components which were only named.

The correlations between attitude towards solar panels and attitude towards the heat pump, with attitude towards the DC house and intention to purchase the DC house, were more moderate but still have a positive relationship. Meaning that a more favorable attitude towards either solar panels or the heat pump relates to a more favorable attitude towards the DC house or intention to purchase the DC house. Attitude towards the battery unit, attitude towards the USB-electric sockets and attitude towards the charging point for electric vehicles have the weakest positive correlation (however still significant) with attitude towards the DC house and intention to purchase the DC house.

Regression

Next we conducted two regression analyses with the aim to identify the main predictor(s) of the two dependent variables (attitude towards the DC house and intention to purchase the DC house'). The predictor variables used in the analyses were: attitude towards DC electricity, attitude towards solar panels, attitude towards the battery unit, attitude towards the charging point for electric vehicles, attitude towards the heat pump, attitude towards the USB-electric sockets, price acceptability, and living surface.

The regression for the first dependent variable attitude DC house showed that both attitude towards direct current and living surface were significant positive predictors for attitude towards DC house (see Table 6). This means that participants who had a more favorable opinion towards direct current and participants who evaluated living surface more positively, generally had a more positive attitude towards the DC house.

Table 6: Regression analyses with dependent variable 'attitude towards the DC house' and predictor variables DC electricity, solar panels, battery, wireless car charger, heat pump, USB-electric sockets, price acceptability, and sufficient living surface.

Variable	**β**	**F**	**R^2**	**Adj. R.**
Constant	-	14.10	.46	.43
Attitude DC electricity	.38*			
Attitude solar panels	.07			
Attitude battery unit	.02			
Attitude charging point electric vehicles	.10			
Attitude heat pump	.10			
Attitude USB-electric sockets	-.07			
Price acceptability	.10			
Living surface	.26*			

*$p < 0.001$

A total of 46% of variance could be explained by this regression model. These results aligns with the result from the correlation analysis where we found that attitude towards the DC house had a stronger positive correlation with attitude towards DC electricity in comparison to the other variables.

The regression for the second dependent variable intention to purchase the DC house showed that attitude towards direct current, price acceptability and living surface were significant predictors of intention to purchase the DC house (see Table 7). This means that participants who had a more favorable opinion towards direct current, participants who evaluated price more positive, and participants who evaluated living surface more positive, generally had a higher intention to purchase the DC house. A total of 50% of the variance could be explained. These results align with the results from the correlational analyses.

Table 7: Regression analyses with dependent variable 'intention to purchase the DC house' and predictor variables DC electricity, solar panels, battery, wireless car charger, heat pump, USB-electric sockets, price acceptability, and sufficient living

Variable	**β**	**F**	**R^2**	**Adj. R**
Constant	-	16.13	.50	.48
Attitude DC electricity	.34*			
Attitude solar panels	-.04			
Attitude battery unit	.02			
Attitude charging point electric vehicles	.02			
Attitude heat pump	.12			
Attitude USB-electric sockets	-.01			
Price acceptability	.21*			
Living surface	.35*			

*$p < 0.01$

DISCUSSION

This experimental study aimed to gain insights into the public acceptance of direct current (DC) electricity systems. We assumed that the DC electricity system would be met with reluctance by consumers. We expected this because the current alternating current (AC) electricity system does not show any clear deficits and therefore no reason nor need to switch to an alternative. The reluctance would be manifested in the form of a status quo bias, meaning that the consumers would be placing an irrational amount of value on maintaining their current AC infrastructure situation.

We examined peoples' attitudes towards a house with a DC system, and its components, and their willingness to purchase such a house. The components of the DC house in this study were: solar panels, a heat pump, a battery unit to store excess energy, USB-

electrical sockets, a charging point for electric vehicles, price acceptability, and living surface. Previous research has shown that when people have a more positive attitude or higher purchase intention towards a certain good, they could be persuaded to get away from the status quo (Polites & Karhanna, 2012). So we examined whether attitudes and intentions to purchase could be influenced by how the components of the house were framed (gain frame vs. loss frame) and whether social proof information was included or not. Literature shows that people attribute a greater value to losses than they do to gains (Kahneman, 1979). Additionally, losses impact a person more negatively, than a gain impacts a person positively. Therefore a loss decreases the chances of a person changing their current situation, and a gain increases the chances of a person changing their current situation (Kahneman & Tversky 1984). In this study participants were presented with either a gain frame scenario or a loss frame scenario concerning the DC house and its components, with the gain frame focusing on what a person may gain when purchasing the house. While a loss frame focused on what a person may lose when purchasing the house.

Furthermore, studies show that the inclusion of a proof of social (un)acceptability for an object can influence a persons' attitude towards that specified object. Meaning that a positive attitude that is communicated by a referent other to people around him/her could invoke a positive attitude in those people around him/her (Cialdini, 1984; Malhotra et. al, 1999). For this study a short story was created that showed that the DC house was an excellent choice to consider. In the story the participants read about reviewers who had stayed in a specially designed house with a DC electricity system, and were told that these reviewers rated the house very positively. This story would act as a form of social proof for the participants. Four different scenarios were created to test if the use of framing (Loss frame vs. Gain frame) and social proof (present vs. absent) impacted the attitude and purchase intention for the developed DC house. Each participant received one of these four scenarios.

Based on the above assumptions regarding framing, we predicted that a gain framed communication of the DC house would lead to a more positive attitude towards the DC house and its components and a higher intention to purchase the DC house than a loss framed communication. Furthermore, we predicted that the inclusion of social proof would lead to a more positive attitude towards the DC house and its components and to a higher intention to purchase the DC house than when social proof was not included.

The results of the present study did not provide any support for our hypotheses. We did not find any main effects of frame or social proof; neither did we find significant interaction effects on the dependent variables. The use of a gain framed communication did

not lead to a more positive attitude towards the DC house nor to a higher intention to purchase the DC house compared to the loss framed communication. Similarly, the inclusion of social proof did not result in a more positive attitude towards the DC house nor a higher intention to purchase the DC house compared to the exclusion of social proof. These results could mean that the use of a gain frame, or the presence of social proof, have the same effect on consumer attitude and intention to purchase as a loss frame and the absence of social proof. Do these results mean that neither framing nor social proof are effective ways to sway consumers away from the status quo, do they mean that there is no status quo bias present for the DC house to begin with, or can they be explained by the set-up of the study?

A possible explanation could be that the manipulations that we presented to the participants were too subtle to have an impact on attitudes and purchase intention. The variations in text between the gain and loss frame were very subtle. We did this by differing only a few words in our framing manipulations, however this difference may have been too subtle. Whenever one conducts a research it is good to be conservative, and being not too eager to get results is also important, but doing this makes the occurrence of a type II error more probable. It should be noted that the differences between the means in manipulation conditions are so small that it is hard to believe that it would have made a difference when the manipulations had been less subtle. This, in combination with the fact that we did not find any effects of the social proof manipulation on any of our dependent variables, leads us to think that possibly something else happened. Because our research involved attitudes towards a new unknown technology, participants first read information about DC electricity and other introductory information before they read the manipulation texts. It could be that this introductory information was more salient than the manipulation texts, and/or that participants had gotten tired/lost their attention when they arrived at the manipulation texts. This might explain why we did not find any effects of our manipulations.

Against expectations, the results showed that the scorings on both attitude towards the DC house and intention to purchase the DC house are high. In this case, high on both variables meant that the attitude towards the DC house is very favorable and the intention to purchase is high. These high scorings on both attitude and intention to purchase could show that there might be another influencing factor for attitude and intention to purchase. When examining the ‘do you have any remarks?’ section we noted that quite a few participants wrote that sustainability plays an important role in their lives. This could possibly explain the high attitudes and intention to purchase scores we found. In the introductory text we had described the DC house and its components as sustainable. This information could have

triggered the participants' already positive sustainability attitudes and influenced their attitude towards the DC house and its components. Therefore, it could be possible that differences between conditions could have existed, but were overshadowed by the presence of the participants' attitude towards sustainability. Even though the presence of a possible sustainability bias may have influenced the results of this study it also offered important insights into possible alternative explanations on the acceptance of DC houses by consumers in the future.

An additional question we wanted to answer with our study was which component(s) of the DC house can potentially play a key role in (creating) a more positive attitude towards DC houses or higher intention to purchase DC houses. To examine this, we assessed attitudes towards several components of the DC house in our study: DC electricity, solar panels, a battery storage unit, a charging point for electric vehicles, a heat pump, USB-electric sockets, living surface, and price acceptability. Positive relations were found between the attitude towards the DC house with the attitude towards DC electricity, attitude towards the heat pump, and living surface. Meaning that a positive attitude towards the DC house also resulted in a positive attitude towards DC electricity, the heat pump and living surface. A similar pattern was found for intention to purchase the DC house: A strong positive relation with the attitude towards DC electricity, living surface, and price acceptability. We argue that this pattern might exist because these components were more salient in comparison with the other components. Tuu and Olsen (2015) reported that customer product knowledge positively influences product attitude and intention to purchase. In the current study participants read (positive) background information about DC electricity, thus creating knowledge and possibly resulting in strong attitude preferences towards DC electricity. Similarly, house owners should be able to formulate their preference in living surface and price acceptance due to personal experience which they gathered through life long experience. A logical explanation for the strong positive relationship with attitude and intention to purchase could be that when a person has a clear preference regarding price, and the price is in line with this expectation, this results in a favorable attitude towards the DC house and a higher intention to purchase the DC house. The same explanation can be given when looking at living surface. Since many people know through personal experience what size house they prefer to live in. If the living surface is in line with their preferences, this results in a favorable attitude towards the DC house and higher intention to purchase the DC house.

Surprisingly, the same strong positive relationship was not found between solar panels and both attitude towards the DC house and the intention to purchase the DC house. There

was a positive relation, but not as strong. Solar panels were expected to be very salient for our participants because it has received a lot of attention in sustainable energy promotions. We could only guess about why solar panels did not have the same strong positive relationship. It might be because the people already know too much about solar panels and that they are familiar with both the pros and the cons of solar panels. This could have balanced peoples' opinions towards solar panels.

Practical implications

Despite the fact that acceptance of innovative goods has been widely researched, the specific implications for the DC energy sector are fairly unknown. The present study has offered some practical information into the possibility of DC houses entering the market. Against the expectations no clear evidence was found for a status quo bias towards AC houses. This is important when looking at the implementation of DC houses in the market. As stated before, a status quo bias towards a certain product can have severe negative consequences for the attitude and intention to purchase towards another similar product. If none such bias exists for AC houses it could ease the way for DC house acceptance. However, as is the case with many other experimental study, the results in this study do not necessarily paint a picture of the real world. Although it might be reassuring for the energy sector to see that people are not necessarily averse towards DC houses. This study has given some insights in important conditions that have to be met when offering a DC house. For example the fact that the house has sufficient living surface and an acceptable price. The fact that these two factors seem significantly important for the acceptance of DC houses is a good thing, since both living surface and price have always been important factors when buying a house. While the results showed that DC, living surface, and price acceptability might be important predictors for the acceptance of DC houses, it is important to note that the other components of the DC house were also viewed positively. Even though these components might not act as predictors of DC acceptance the results showed that people do not necessarily have a negative view on any of the DC house components.

Another positive influence on the acceptance of DC houses, which has been named before, could be people with a positive attitude towards sustainability. Indications have been found in this study that a positive attitude towards sustainability could positively influence attitudes towards the DC house and its components. DC houses are sustainable products, and this fact might be an important marketing tool to reach people who are particularly sensitive for sustainable goods. These people can play a key role in the acceptance of DC houses in the

market, by making the transition from the current AC electricity system to the DC electricity system. They could act as pioneers and show that the system is viable and should be adopted by other consumers as well. The last decades the need for sustainable behavior has increased rapidly, and whenever sustainable goods are introduced to the market they are most of the times met with positivity. The government encourages sustainable behavior by offering monetary incentives to people who make increased efforts to be sustainable. The findings from this study suggest that there is an indirect indication that the DC house in combination with sustainability attitudes and economic benefits can lead people to consider buying a DC house in the future.

Limitations

As mentioned before the gain and loss frame manipulation could have been too subtle to lead to any significant differences in attitude or purchase intentions. The same could be stated for the social proof manipulation which could have had the same limitations. It could be that the social references we tried to create were too abstract to lead to any of the predicted effects. We stated in the social proof manipulation that the people who reviewed the DC house were people from a wide array of social demographics. By telling the participants this we aimed to create a feeling of inclusiveness to this group for our participant. However, by using a general group which is relevant to all participants it could have been too vague for any participant to truly have feel like it is a representation of their identity. Cialdini (1984) wrote that one of the most important conditions for social proof to work is the ability to identify with the referent other. The more similar the other person is the greater the chance that social proof has an effect. Therefore, in this study the social proof could have been to abstract for any of the participant to identify with, since everyone belongs to one of the social demographics. It is possible that the construct of social proof has difficulty to reach its full potential in a very diverse sample, because you need one or more stable identifiers for every participant.

Additionally, every manipulation was preceded by a quite intensive introduction text. The introduction, manipulation, and questionnaire combined were around eight pages and took around 15 minutes to finish. It could have been that the subtlety of the manipulations in combination with the duration and intensity of the scenarios resulted in a weakened effect.

In this study we chose to focus solely on a few psychological constructs which we expected to influence the attitude towards the DC house and intention to purchase the DC house. While we know that in a research design one can never measure every possible

construct, we do note that one construct was expected to have a strong influence on the decision making process when purchasing a house. This construct was the financial aspect when purchasing a house. When one buys a house in real-life pricing and current financial budget play an important role. In our study we told participants that they should picture a situation in which they had a budget of €380.000 and we purposely set the price of the house below that budget. We expected that this would negate the financial predicaments people normally have when buying a house, but from the responses we got this did not seem to be the case. Multiple participants noted, either in the 'additional comment' box or face-to-face, that they were not able to imagine the situation even though we told them the house was within their budget. This inability to imagine a situation could have resulted in inaccurate results from these participants.

Knowing that people seemingly have a hard time to imagine a situation where they have a lot of money (when in real-life they do not), it could be interesting to research the interaction between psychological and financial factors and their predictive value towards decision with a big impact on a persons' financial (and psychological) well-being in future research. Specifically when looking at the future market for DC houses, it could be important to research whether people are motivated to engage in a large investment with a return of small savings on a longer term. However at the same time, it should be noted, that whenever a person buys a house, either an AC or a DC house, a large investment is needed for the purchase. While an AC house has less expected long term saving options in comparison to a DC house, this saving potential could also serve as an important motivator for people to make the transition.

As mentioned before we expect that there might be a difference in knowledge our participants had in regard to the separate components of the DC house. While they were informed clearly about DC, they were left in the dark regarding other components like the battery unit and the heat pump. Some of our participants indicated in the 'remark' box that they wished that they had more information available to them about the DC house and its components, and that they felt they could not know enough about the house in order to make a proper decision. It might be interesting for future research to vary the focus on the information provided about the components of the DC house.

In conclusion, the results show that there might be a bright future for direct current houses. Future research could benefit from a deeper understanding between the interaction between psychological and financial aspect and their predictive value on the acceptance of direct current. Additionally, the provision of accurate information about the positive and

negative aspect of the direct current house and its components could serve as an important stepping stone to create more support for the use of direct current electricity in houses. Marketing strategies aimed on the promotion of direct current houses, and the provision of information, can lead to increasingly positive attitudes and high intentions to purchase. And maybe in a few decades, everyone is living in a state of the art direct current house.

References

Ajzen, L. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*, 179 – 211.

Bhargava, N. N., & Kulshreshtha, N. B. S. G. D. (1984). Basic Electronics and Linear Circuits. Tata McGraw-Hill Education.

Cialdini, R. B. (1984). *Influence: how and why people agree to things.* New York: Morrow.

De Kruik, M. (2012). Overheidsuitgaven klimaatbeleid nemen toe. *Centraal Bureau voor Statistiek.* Retrieved from: https://www.cbs.nl/nlnl/nieuws/2012/38/overheidsuitgaven-klimaatbeleid-nemen-toe

Dunphy, S., & Herbig, P. A. (1995). Acceptance of innovations: the customer is the key! *The Journal of High Technology Management Research*, *6*, 193 – 209.

Huberty, M., & Zysman, J., 2010. An energy system transformation: Framing research choices for the climate challenge. *Research Policy, 39*, 1027–1029.

Hartman, R. S., Doane, M. J. & Woo, C. (1991). Consumer rationality and the status quo. The Quarterly Journal of Economics, *106(1)*, 141 – 162.

Kahneman, D. & Tversky, A. (1979). Prospect theory: an analysis of decision making under risk. *Econometrica: Journal of the Econometric Society, 47*, 263 – 291.

Kahneman, D. & Tversky, A. (1984). Choices, values, and frames. *American Psychologist,* 39(4*)*, 341-350.

Kim. H. & Kankanhalli, A. (2009). Investigating user resistance to information systems implementation: A status quo bias. *MIS Quarterly*, *33*, 567 – 582.

Malhotra, Y., & Galletta, D. F. (1999). Extending the technology acceptance model to account for social influence: Theoretical bases and empirical validation. In *Systems sciences, 1999. HICSS-32. Proceedings of the 32nd annual Hawaii international conference on*, 1 – 14.

Mackay, L. (2015). Universal Direct Current Distribution System. *TU Delft.* Retrieved from: http://www.ewi.tudelft.nl/en/the-faculty/departments/electrical-sustainable-energy/dc-systems-energy-conversion-storage/research/universal-direct-current-distribution-system/

Pang, H., Lo, E. & Pong, B. (2006). Dc electrical distribution systems in buildings. *International Conference on Power Electronics Systems and Applications, 2*, 115 – 119.

Polites, G. & Karahanna, E. (2012). Shackled to the status quo: the inhibiting effects of incumbent system habit, switching costs, and inertia on new system acceptance. *MIS Quarterly, 36*, 21 – 42.

Spence, A. & Pidgeon, N. (2010). Framing and communicating climate change: the effects of distance and outcome frame manipulations. *Global Environmental Change, 20*, 656 – 667.

Tsur, Y., Sternberg, M., & Hochman, E. (1990). Dynamic modelling of innovation process adoption with risk aversion and learning. *Oxford Economic Papers, 42*, 336 – 355.

Tuu, H., & Olsen, S. (2015). Certainty, risk and knowledge in the satisfaction-purchase intention relationship in a new product experiment. *Asia Pacific Journal of Marketing and Logistics, draft*, 1 – 38.

United Nations (1992). The United Frameworks Convention on Climate Change. *Article 2.*

Yazdanpanah, M. & Forouzani, M. (2015). Application of the theory of planned behavior to predict Iranian students' intention to purchase organic food. *Journal of Cleaner Production, 107*, 342 – 352.

Appendix A: Informed Consent (in Dutch)

Universiteit Leiden

Faculteit der Sociale Wetenschappen
Departement Psychologie

Instemmingsformulier voor deelname aan onderzoek

In dit onderzoek leggen we u een beschrijving voor van een situatie. We vragen u om zich in te leven in de situatie en zijn benieuwd naar uw mening over deze situatie. Uiteraard zijn er hierbij geen goede of foute antwoorden, het gaat om uw mening. Het onderzoek duurt ongeveer 15 minuten.

Indien u vragen heeft dan kunt u deze stellen aan degene van wie u de vragenlijst heeft gekregen. Deelname aan het onderzoek is vrijwillig en u heeft het recht om zonder opgaaf van reden met het onderzoek te stoppen.

Er wordt geen koppeling gemaakt tussen uw naam en uw antwoorden op de vragenlijst. De data worden geanonimiseerd voor de analyses plaatsvinden. De uitkomsten zijn dus niet te koppelen aan individuele deelnemers.

Uw antwoorden worden samengevoegd met die van andere (anonieme) deelnemers aan het onderzoek, aan een statistische analyse onderworpen en eventueel gebruikt in wetenschappelijke publicaties.

Verklaring:

- Ik heb bovenstaande informatiebrief voor deelnemers gelezen. Ik kon aanvullende vragen

stellen. Mijn vragen zijn afdoende beantwoord. Ik had voldoende tijd om te beslissen of

ik meedoe.

- Ik weet dat meedoen helemaal vrijwillig is. Ik weet dat ik op ieder moment kan

beslissen om toch niet mee te doen of te stoppen. Daarvoor hoef ik geen reden te geven.

- Mijn antwoorden worden gecodeerd verwerkt.

- Ik geef toestemming om mijn gegevens te gebruiken, voor de doelen die in de

informatiebrief staan.

- Ik ben 18 jaar oud of ouder

Ik geef toestemming om aan dit onderzoek mee te doen.

Naam deelnemer: _____

Handtekening: _____

Datum: _____/_____/_____

Voor vragen en/of opmerkingen over dit onderzoek kunt u contact opnemen met dr. Emma ter Mors

Email: emors@fsw.leidenuniv.nl; Tel. 071 – 5274075

Hieronder ziet u een voorbeeldvraag en een uitleg over de antwoordschaal die gebruikt wordt in het onderzoek.

	Helemaal mee oneens				Helemaal mee eens
	↓				↓
Ik vind het gezellig om voor de televisie te eten	1	2	3	4	5

Als u het heel erg eens bent met deze stelling, dan omcirkelt u nummer 5. Vindt u voor de televisie eten niet gezellig, maar ook niet ongezellig, dan omcirkelt u nummer 3. Als u het enigszins ongezellig vindt om voor de televisie te eten, dan omcirkelt u nummer 2. Geef bij iedere vraag het antwoord dat uw mening het beste weergeeft.

Appendix B – 1: Scenario – general part (in Dutch)

Fijn dat u meedoet aan dit onderzoek!

U krijgt zodadelijk een beschrijving van een situatie te lezen. Lees de tekst alstublieft goed door en leef u in de situatie in. Daarna stellen wij u een aantal vragen over deze situatie.

Situatie

Stelt u zich voor dat u wilt verhuizen en op zoek bent naar een koopwoning. U heeft een budget van 380000 euro en uw voorkeur gaat uit naar een nieuwbouwwoning. Via vrienden hoort u over een mogelijk interessant nieuwbouwproject genaamd “Randstad van de toekomst”. De prijs van de woningen binnen dit nieuwbouwproject valt binnen uw budget.

Wat bijzonder is aan de woningen is dat ze onder andere zonnepanelen op het dak hebben en dat de energievoorziening in de woning op basis van gelijkstroom plaatsvindt. In dit onderzoek zijn we benieuwd naar uw mening over deze specifieke woningen met gelijkstroom. Voordat we u naar uw mening vragen krijgt u eerst wat belangrijke achtergrondinformatie te lezen over de woning en over de energievoorziening. Lees deze informatie aandachtig door.

Belangrijke achtergrondinformatie

Nederlandse woningen en huishoudens worden steeds duurzamer en milieuvriendelijker. De woningen waar we uw mening over willen vragen spelen op deze ontwikkeling in. Terwijl de meeste bestaande woningen in Nederland een energievoorziening op basis van *wisselstroom* hebben, hebben de woningen in het nieuwbouwproject “Randstad van de Toekomst” een energievoorziening op basis van *gelijkstroom*.

Een voordeel van een woning met gelijkstroom ten opzichte van een woning met wisselstroom is dat deze minder energie verbruikt. Er kan tot wel 20 procent energie bespaard worden. Dit komt doordat bijna alle apparaten die we in huis gebruiken werken op gelijkstroom. In woningen met wisselstroom moet de stroom die uit het stopcontact komt eerst met adapters omgezet worden in gelijkstroom voordat een apparaat de stroom kan gebruiken. Dit zorgt voor energieverlies, bijvoorbeeld in de vorm van warmte die ontsnapt via de adapter van een laptop. In een woning met een gelijkstroom infrastructuur zoals in het nieuwbouwproject “Randstad van de toekomst” kan de stroom die uit de muur komt direct, zonder tussenkomst van adapters, gebruikt worden door apparaten. Dit maakt dat een woning met gelijkstroom minder energie gebruikt dan een woning met wisselstroom.

Daarnaast zullen in een woning met een gelijkstroom energievoorziening de apparaten minder snel kapot gaan en langer gebruikt kunnen worden. Dit komt doordat het bij apparaten vaak de adapters zijn die snel kapot gaan. Bij zonnepanelen gaat bijvoorbeeld de transformator vaak binnen 10 jaar kapot en dient deze vervangen te worden. In een woning met gelijkstroom infrastructuur is zo’n transformator niet meer nodig. Hierdoor gaan apparaten langer mee en wordt er op termijn geld bespaard.

Een gelijkstroom woning sluit tenslotte beter aan bij de energievoorziening van de toekomst dan de huidige woningen met wisselstroom. We zullen in de toekomst namelijk steeds meer

en vaker zelf energie opwekken en elektrisch gaan rijden. Hierbij is het goed om te weten dat zonnepanelen gelijkstroom opwekken en dat elektrische auto's gelijkstroom gebruiken. Een woning met een gelijkstroom infrastructuur wordt geschetst door experts als een zelfvoorzienend geheel.

Kortom, voordelen van een woning op basis van gelijkstroom zijn onder andere:

- Een woning met gelijkstroom gebruikt minder energie dan een woning met wisselstroom: er kan wel tot 20 procent energie bespaard worden.
- In een woning met gelijkstroom energievoorziening gaan apparaten langer mee en wordt er op termijn geld bespaard.
- Een woning met gelijkstroom sluit beter aan bij de energievoorziening van de toekomst dan de huidige woningen met wisselstroom.

Appendix B – 2: Scenario - Gain frame, no Social proof condition (in Dutch)

Uw mening over de woningen “Randstad van de toekomst”

Nu u deze achtergrondinformatie over gelijkstroom heeft gelezen, willen we uw mening vragen over de woningen binnen het “Randstad van de toekomst” project. Alle woningen binnen dit project hebben een gelijkstroom energievoorziening zoals hierboven beschreven.

Situatie:

Stelt u zich voor dat u wilt verhuizen en dat u op zoek bent naar een koopwoning. U heeft een budget van 380000 euro en vrienden wijzen u op woningen binnen het “Randstad van de Toekomst” nieuwbouwproject. De prijs van deze woning ligt binnen uw budget, en is een zelfvoorzienend geheel zoals hierboven besproken. De Technische Universiteit Delft heeft de woningen ontworpen en eind 2014 is de eerste woning opgeleverd.

Hieronder ziet u een afbeelding van één van de woningen binnen het “Randstad van de toekomst” project en krijgt u extra informatie over de woning. Lees deze informatie goed door.

De woning heeft de volgende kenmerken:

- De vraagprijs is 365000 euro (vrij op naam).
- Woonoppervlak is 160 m^2; perceeloppervlak 400 m^2; 5 kamers.
- Zonnepanelen op het dak wekken elektriciteit op die opgeslagen wordt in een batterij in de woning. Deze batterij zal als energiebron dienen tijdens de nacht.
- Op de oprit is een oplaadpunt voor elektrische voertuigen, het vervoermiddel van de toekomst.
- Een warmtepomp zorgt voor de verwarming en warmwatervoorziening in de woning.
- De woning heeft USB-stopcontacten die zowel elektriciteit als internet leveren en waar de nieuwe generatie van apparaten binnenkort aan moeten voldoen.

Appendix B – 3: Scenario - Gain frame, social proof condition (in Dutch)

Uw mening over de woningen “Randstad van de toekomst”

Nu u deze achtergrondinformatie over gelijkstroom heeft gelezen, willen we uw mening vragen over de woningen binnen het “Randstad van de toekomst” project. Alle woningen binnen dit project hebben een gelijkstroom energievoorziening zoals hierboven beschreven.

Situatie:

Stelt u zich voor dat u wilt verhuizen en dat u op zoek bent naar een koopwoning. U heeft een budget van 380000 euro en vrienden wijzen u op woningen binnen het “Randstad van de Toekomst” nieuwbouwproject. De prijs van deze woning ligt binnen uw budget, en is een zelfvoorzienend geheel zoals hierboven besproken. De Technische Universiteit Delft heeft de woningen ontworpen en eind 2014 is de eerste woning opgeleverd.

Om te onderzoeken hoe mensen de woonsituatie ervaren volgt het team van de Technische Universiteit Delft de eerste huizenkopers binnen het project en kunnen mensen een maand proef wonen in een gelijkstroom woning. De eerste gebruikers van de woning beoordelen de woonervaring en de woning als uitstekend. De mensen die een maand proef gewoond hebben, kwamen uit gevarieerde bevolkingsklassen en beoordelen de woonervaring en de woning zelf erg positief: het gemiddelde rapportcijfer was 8.6 op een schaal van 10.

Hieronder ziet u een afbeelding van één van de woningen binnen het “Randstad van de toekomst” project en krijgt u extra informatie over de woning. Lees deze informatie goed door.

De woning heeft de volgende kenmerken:

- De vraagprijs is 365000 euro (vrij op naam)
- Woonoppervlak is 160 m^2; perceeloppervlak 400 m^2; 5 kamers
- Zonnepanelen op het dak wekken elektriciteit op die opgeslagen wordt in een batterij in de woning. Deze batterij zal als energiebron dienen tijdens de nacht.
- Op de oprit is een oplaadpunt voor elektrische voertuigen, het vervoermiddel van de toekomst.
- Een warmtepomp zorgt voor de verwarming en warmwatervoorziening in de woning.
- De woning heeft USB-stopcontacten die zowel elektriciteit als internet leveren en waar de nieuwe generatie van apparaten binnenkort aan moeten voldoen.

Appendix B – 4: Scenario – Loss frame, no social proof condition (in Dutch)

Uw mening over de woningen "Randstad van de toekomst"

Nu u deze achtergrondinformatie over gelijkstroom heeft gelezen, willen we uw mening vragen over de woningen binnen het "Randstad van de toekomst" project. Alle woningen binnen dit project hebben een gelijkstroom energievoorziening zoals hierboven beschreven.

Situatie:

Stelt u zich voor dat u wilt verhuizen en dat u op zoek bent naar een koopwoning. U heeft een budget van 380000 euro en vrienden wijzen u op woningen binnen het "Randstad van de Toekomst" nieuwbouwproject. De prijs van deze woning ligt binnen uw budget, en is een zelfvoorzienend geheel zoals hierboven besproken. De Technische Universiteit Delft heeft de woningen ontworpen en eind 2014 is de eerste woning opgeleverd.

Hieronder ziet u een afbeelding van één van de woningen binnen het "Randstad van de toekomst" project en krijgt u extra informatie over de woning. Lees deze informatie goed door.

De woning heeft de volgende kenmerken:

- De vraagprijs is 365000 euro (vrij op naam)
- Woonoppervlak is 160 m^2; perceeloppervlak 400 m^2; 5 kamers
- Zonnepanelen zijn op het dak geïnstalleerd, waardoor het huidige vertrouwde straatbeeld zal veranderen. Deze zonnepanelen wekken elektriciteit op die opgeslagen wordt in een batterij in de woning. Deze batterij zal als energiebron dienen tijdens de nacht.
- Op de oprit is een oplaadpunt voor elektrische voertuigen, het vervoermiddel van de toekomst. Elektrische voertuigen zullen in de toekomst de vertrouwde voertuigen die op gas en benzine rijden gaan vervangen.
- Een warmtepomp zorgt voor de verwarming en warmwatervoorziening in de woning, in plaats van de vertrouwde CV ketel of boiler.
- De stopcontacten zoals u ze kent worden vervangen door USB-stopcontacten. Deze USB-stopcontacten leveren zowel elektriciteit als internet : het is zo dat de nieuwe generatie van apparaten hier binnenkort aan moet voldoen.

Appendix B – 5: Scenario – Loss Frame, Social proof condition (in Dutch)

Uw mening over de woningen "Randstad van de toekomst"

Nu u deze achtergrondinformatie over gelijkstroom heeft gelezen, willen we uw mening vragen over de woningen binnen het "Randstad van de toekomst" project. Alle woningen binnen dit project hebben een gelijkstroom energievoorziening zoals hierboven beschreven.

Situatie:

Stelt u zich voor dat u wilt verhuizen en dat u op zoek bent naar een koopwoning. U heeft een budget van 380000 euro en vrienden wijzen u op woningen binnen het "Randstad van de Toekomst" nieuwbouwproject. De prijs van deze woning ligt binnen uw budget, en is een zelfvoorzienend geheel zoals hierboven besproken. De Technische Universiteit Delft heeft de woningen ontworpen en eind 2014 is de eerste woning opgeleverd.

Om te onderzoeken hoe mensen de woonsituatie ervaren volgt het team van de Technische Universiteit Delft de eerste huizenkopers binnen het project en kunnen mensen een maand proef wonen in een gelijkstroom woning. De eerste gebruikers van de woning beoordelen de woonervaring en de woning als uitstekend. De mensen die een maand proef gewoond hebben, kwamen uit gevarieerde bevolkingsklassen en beoordelen de woonervaring en de woning zelf erg positief: het gemiddelde rapportcijfer was 8.6 op een schaal van 10.

Hieronder ziet u een afbeelding van één van de woningen binnen het "Randstad van de toekomst" project en krijgt u extra informatie over de woning. Lees deze informatie goed door.

De woning heeft de volgende kenmerken:

- De vraagprijs is 365000 euro (vrij op naam)
- Woonoppervlak is 160 m^2; perceeloppervlak 400 m^2; 5 kamers
- Zonnepanelen zijn op het dak geïnstalleerd, waardoor het huidige vertrouwde straatbeeld zal veranderen. Deze zonnepanelen wekken elektriciteit op die opgeslagen wordt in een batterij in de woning. Deze batterij zal als energiebron dienen tijdens de nacht.
- Op de oprit is een oplaadpunt voor elektrische voertuigen, het vervoermiddel van de toekomst. Elektrische voertuigen zullen in de toekomst de vertrouwde voertuigen die op gas en benzine rijden gaan vervangen.

- Een warmtepomp zorgt voor de verwarming en warmwatervoorziening in de woning, in plaats van de vertrouwde CV ketel of boiler.
- De stopcontacten zoals u ze kent worden vervangen door USB-stopcontacten. Deze USB-stopcontacten leveren zowel elektriciteit als internet : het is zo dat de nieuwe generatie van apparaten hier binnenkort aan moet voldoen.

Appendix C: Questionnaire (in Dutch)

De volgende vragen gaan over uw mening over de woning waarover u zojuist heeft gelezen. *Beantwoord alstublieft alle vragen. Geef aan in hoeverre u het eens of oneens bent met elk van de volgende stellingen.*

	Helemaal mee oneens ↓				Helemaal mee eens ↓
1. Ik vind de woning interessant	1	2	3	4	5
2. De woning spreekt mij aan	1	2	3	4	5
3. Ik vind de woning aantrekkelijk	1	2	3	4	5
4. Ik zou in de woning willen wonen	1	2	3	4	5
5. Ik zou overwegen de woning te kopen	1	2	3	4	5
6. Ik zou bereid zijn de woning te kopen	1	2	3	4	5
7. De prijs van de woning is acceptabel	1	2	3	4	5
8. Het woonoppervlak van de woning komt overeen met mijn woonwensen	1	2	3	4	5

Zoals u heeft kunnen lezen heeft de woning een energievoorziening op basis van <u>gelijkstroom</u>. We zijn benieuwd naar uw mening hierover. *Geef aan in hoeverre u het eens of oneens bent met elk van de volgende stellingen .*

	Helemaal mee oneens ↓				Helemaal mee eens ↓
9. Ik vind het interessant dat de woning een energievoorziening op basis van gelijkstroom heeft	1	2	3	4	5
10. Ik vind het een belangrijk voordeel dat de woning een energievoorziening op basis van gelijkstroom heeft	1	2	3	4	5
11. Ik heb er vertrouwen in dat de energievoorziening op basis van gelijkstroom goed werkt	1	2	3	4	5
12. Ik vind het geruststellend dat de woning een energievoorziening heeft op basis van gelijkstroom	1	2	3	4	5
13. Ik vind het verontrustend dat de woning een energievoorziening heeft op basis van gelijkstroom	1	2	3	4	5
14. Ik vind het verstandig om te kiezen voor een woning met gelijkstroom energievoorziening	1	2	3	4	5

15. Als dezelfde woning ook verkrijgbaar zou zijn met een wisselstroom energievoorziening in plaats van een gelijkstroom energievoorziening en evenveel kosten dan zou ik liever voor de woning met de wisselstroom energievoorziening gaan	1	2	3	4	5

Zoals u heeft kunnen lezen heeft de woning zonnepanelen op het dak en wordt de opgewekte elektriciteit opgeslagen in een batterij in de woning. We zijn benieuwd naar uw mening hierover. *Geef aan in hoeverre u het eens of oneens bent met elk van de volgende stellingen.*

	Helemaal mee oneens ↓				Helemaal mee eens ↓
16. Ik vind het interessant dat de woning zonnepanelen op het dak heeft	1	2	3	4	5
17. Ik vind het belangrijk dat de woning zonnepanelen op het dak heeft	1	2	3	4	5
18. Ik vind het een belangrijk voordeel dat de woning zonnepanelen op het dak heeft	1	2	3	4	5
19. Ik vind het interessant dat de opgewekte elektriciteit opgeslagen wordt in een batterij in de woning	1	2	3	4	5
20. Ik vind het belangrijk dat de opgewekte elektriciteit opgeslagen wordt in een batterij in de woning	1	2	3	4	5
21. Ik vind het een belangrijk voordeel dat de opgewekte elektriciteit opgeslagen wordt in een batterij in de woning	1	2	3	4	5

Zoals u heeft kunnen lezen heeft de woning op de oprit een oplaadpunt voor elektrische voertuigen. We zijn benieuwd naar uw mening hierover. *Geef aan in hoeverre u het eens of oneens bent met elk van de volgende stellingen.*

	Helemaal mee oneens ↓				Helemaal mee eens ↓
22. Ik vind het interessant dat de woning een oplaadpunt voor elektrische voertuigen heeft	1	2	3	4	5
23. Ik vind het belangrijk dat de woning een oplaadpunt voor elektrische voertuigen heeft	1	2	3	4	5
24. Ik vind het een belangrijk voordeel dat de woning een oplaadpunt voor elektrische voertuigen heeft	1	2	3	4	5

Zoals u heeft kunnen lezen heeft de woning een warmtepomp die zorgt voor de verwarming en warmwatervoorziening in de woning. We zijn benieuwd naar uw mening hierover. *Geef aan in hoeverre u het eens of oneens bent met elk van de volgende stellingen.*

	Helemaal mee oneens ↓				Helemaal mee eens ↓
25. Ik vind het interessant dat de woning een warmwaterpomp heeft	1	2	3	4	5
26. Ik vind het belangrijk dat de woning een warmwaterpomp heeft	1	2	3	4	5
27. Ik vind het een belangrijk voordeel dat de woning een warmwaterpomp heeft	1	2	3	4	5

Zoals u ook heeft kunnen lezen heeft de woning USB stopcontacten die zowel elektriciteit als internet leveren en waar de nieuwe generatie van apparaten binnenkort aan moet voldoen. We zijn benieuwd naar uw mening hierover. *Geef aan in hoeverre u het eens of oneens bent met elk van de volgende stellingen.*

	Helemaal mee oneens ↓				Helemaal mee eens ↓
28. Ik vind het interessant dat de woning USB stopcontacten heeft	1	2	3	4	5
29. Ik vind het belangrijk dat de woning USB stopcontacten heeft	1	2	3	4	5
30. Ik vind het een belangrijk voordeel dat de woning USB stopcontacten heeft	1	2	3	4	5

Tenslotte nog een aantal vragen over uzelf:

31. Ik ben een:
Kruis aan wat van toepassing is.

- o man
- o vrouw
- o anders, namelijk .....

32. Wat is uw leeftijd?

_____

33. Wat is uw hoogst afgeronde opleiding?
Kruis aan wat van toepassing is.

- o Basisonderwijs
- o Middelbaar onderwijs: VMBO/MAVO/LBO
- o Middelbaar onderwijs: HAVO/VWO
- o Middelbaar Beroeps Onderwijs (MBO)
- o Propedeuse Hoger Beroeps Onderwijs (HBO)
- o Bachelor Hoger beroeps Onderwijs (HBO)
- o Master Hoger Beroeps Onderwijs (HBO)
- o Propedeuse Universiteit
- o Bachelor Universiteit
- o Master Universiteit
- o Zeg ik liever niet

34. Woont u in een koop of huurwoning?
Kruis aan wat van toepassing is.

- o Koopwoning
- o Huurwoning
- o Anders, namelijk .....

Dit is het einde van de vragenlijst. Hartelijk bedankt voor uw tijd en medewerking!
U kunt de ingevulde vragenlijst inleveren bij degene van wie u de vragenlijst ontvangen heeft.

Eventuele opmerkingen kunt u hier kwijt:

……
……
……

Appendix D: Debriefing (in Dutch)

Debriefing

Hartelijk dank voor uw deelname aan dit onderzoek. Hierbij willen wij u wat meer toelichten over ons onderzoek.

In dit experiment onderzoeken wij welke factoren mensen helpen bij het accepteren van een huis die afwijkt van de standaard. In dit onderzoek ging het specifiek over een huis dat functioneert op een alternatieve stroom soort. Deze techniek word momenteel ontwikkeld door de Technische Universiteit Delft. Zij vragen zich af wat mensen overhaalt om over te stappen naar hun gelijkstroom systeem. Hoewel het systeem al wel in ontwikkeling is, zijn er nog geen huizen in gebruik genomen met dit systeem. Deze informatie is toegevoegd in de scenario's om het voor u zo levensecht mogelijk te laten lijken. De informatie over huizen met een gelijkstroom infrastructuur die wij u hebben verschaft, is echter accuraat.

Voor dit onderzoek zijn verschillende scenario's ontwikkeld, waarvan u er één heeft gelezen. Deze scenario's verschilden van elkaar, op basis van twee factoren waarvan wij verwachten dat ze invloed hebben op de mening en koop intentie ten opzichte van het type huis dat wij aan u hebben omschreven. Een van de factoren was de toevoeging van een stuk over de mening van andere personen over dit huis. De helft van de deelnemers van dit onderzoek lezen dat recensenten het huis hebben beoordeeld met een 8.6 op een schaal van 10. Wanneer dit stukje tekst toegevoegd is, wordt verwacht dat personen een positievere mening en grotere koopintentie hebben. Het huis is in werkelijkheid echter niet beoordeeld door recensenten.

De tweede factor die verschilde tussen de scenario's is de manier van brengen van de informatie. Ook bij deze factor heeft u één van twee mogelijke variaties in handen gekregen. De eerste manier van schrijven heeft zich meer gericht op wat u, als consument, *verkrijgt* wanneer u overstapt naar het gelijkstroom systeem. De tweede schrijfstijl richtte zich daarentegen op wat u *verliest* bij de overstap naar het nieuwe systeem. Uit onderzoek is namelijk gebleken dat consumenten positiever over een product zijn wanneer er wordt benadrukt wat zij verkrijgen in plaats van wat zij verliezen.

Mocht u nog vragen hebben over het onderzoek of de resultaten van het onderzoek, dan kunt u mailen of bellen naar Emma ter Mors. Email: emors@fsw.leidenuniv.nl; Tel. 071 – 5274075.

Nogmaals hartelijk bedankt voor uw deelname aan ons onderzoek.

Appendix E: Test of assumptions ANOVA

To test the assumption of normality the data of the two dependent variables, attitude towards the DC house and intention to purchase the DC house, were explored. The histograms of both dependent variables showed a slight skew to the left side. This could be explained by the fact that the mean (M) of both variables was situated around 4, on a five point Likert scale. To statistically check if the variables were distributed normally a Kolmogorov-Smirnov test (K-S test) was conducted. There has to be noted that with a sample size of N = 139 this sample can be seen as robust and therefore the K-S test is easily significant. For both 'attitude towards the DC house' and 'intention to purchase the DC house' the K-S was highly significant ($p < 0.001$). Therefore the assumption of normality had not been violated for the two variables.

To test the assumption of homogeneity of variance we performed the Levene's Test for Equality of Variances on the variables. Levene's Test was not significant ($p > 0.05$) for 'attitude towards the DC house' and 'intention to purchase the DC house'. So the assumption of homogeneity of variances was met for these two variables.

To test the assumption of independence of error one should look at the design of the study. We designed this study to be an experimental between-subject design with random allocation. Through this random allocation we significantly lowered the chance of the assumption of independence of error to be violated. Furthermore, in this experiment most of the participants were asked to participate in an environment where people are expected to be quiet. Additionally every participant was asked not to talk about the experiment before everyone was finished, and if they knew someone still had to fill in the questionnaire. This went well for most of the participants. There was one case in which two participants were discussing their answer when one of the researchers came pick up their questionnaire. A few follow up questions were asked to check in what way they could have influenced each other; from these questions it showed that they had only started talking after they were finished. They made no alterations to their answers from that point. Knowing these things we can say that the assumption of independence of observations has not been violated.