How can utilities affect residents' energy-efficiency investment intentions?

A mixed-method study on how utilities can leverage marketing communication to affect residents' behavioural intention of energy-efficiency investments.

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Abstract

Enforcing EU legislation and high electricity prices urge Norwegian residents to undertake energy-efficiency investments. However, investment inefficiencies, such as imperfect information on energy-efficiency investment possibilities, hinder such investments, attributing a significant gap between the actual and optimal level of energy use, namely "the energy-efficiency gap". Previous research suggests that increased energy-efficiency investments by residents can mitigate the energy-efficiency gap, and advocates electricity utilities, referred to as utilities in this study, to help residents undertake such investments. Thus, this study aims to answer the following research question: *"How can utilities leverage marketing communication to affect residents' behavioural intention of energy-efficiency investments?".*

A mixed-method approach includes interviews with employees of a Norwegian utility and a focus group with the utility's residential customers. Concurrently, a survey is conducted on the utility's residential customers for triangulation and generalisation of findings. A multiple regression, adapting the theory of planned behaviour (TPB) constructs, measures residential customers' behavioural intention of energy-efficiency investments based on energy-efficiency information from the utility. The findings substantiate that utilities can leverage marketing communication to affect residents' behavioural intention of energy-efficiency investments by enhancing targeting, relevancy, and quality of the energy-efficiency information.

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1.0 Introduction

Research in the energy domain refers to the concept of "the energy-efficiency gap," which is the difference between the actual and optimal level of energy use (Alcott & Greenstone, 2012; Jaffe & Stavins, 1994). Although energy-efficiency investments such as insulation upgrades and solar panels promise significant reductions in the economic costs associated with energy use are available to residents, it does not seem that they are being adopted to the extent that would be justified. Previous studies attribute the energy-efficiency gap to market failures, behavioural anomalies, and model and measurement errors (Allcott & Greenstone, 2012; Gerarden et al., 2017; Gillingham & Palmer, 2014; Jaffe & Stavins, 1994; Palmer et al., 2013). Additionally, electricity prices have been of low interest to residents due to their low cost, leading to a lack of incentives to improve their residences' energy efficiency (Gillingham & Palmer, 2014; Henryson et al., 2000; Jaffe & Stavins, 1991; Sutherland, 1991). However, recent factors encouraging increased energy-efficiency investments have occurred in later years.

As concerns regarding climate change intensify, so does the emphasis on energy efficiency (Allcott & Greenstone, 2012; Gillingham et al., 2009). To tackle the global climate challenges, EU legislation has been introduced to increase energy efficiency. Regarding residential buildings, the Energy Performance of Buildings Directive recently instituted that each Member State, such as Norway, must establish a national strategy to reduce their average primary energy use by 16% by 2030 and 20-22% by 2035 (European Commission, 2023). Thus, this demands substantial energy-efficiency investments by residents who do not necessarily know which energy-efficiency investments are adequate for their residences (European Environment Agency, 2023). Additionally, historically high electricity prices incentivise residents to undertake energy-efficiency investments that could profit them economically, which has previously functioned as an investment inefficiency (Gillingham & Palmer, 2014; Henryson et al., 2000; Sutherland, 1991).

However, actors in the energy market are assisting residents with undertaking energy-efficiency investments, namely electricity utilities, referred to as utilities in this study. Investigating how utilities can contribute to this matter is exciting because a paradox is

recognised in their efforts to help residents with energy efficiency (Sousa et al., 2013). The latter paradox relates to the utilities' interest in engaging in activities that could reduce their income from residents' energy consumption (Kushler et al, 2006). Furthermore, a typical mean related to this practice is marketing communication of energy-efficiency information to their residential customers. Building on the context of the preceding introduction, this thesis seeks to answer the following research question:

RQ: *How can utilities leverage marketing communication to affect residents' behavioural intention of energy-efficiency investments?*

For triangulation, a mixed-method approach, including qualitative and quantitative research, is utilised to answer the research question (Creswell et al., 2003; Golafshani, 2003; Tashakkori & Teddlie, 2003). The context for the thesis is Norwegian utilities, and the data includes interviews with employees of a Norwegian utility, as well as a focus group and survey conducted on the same utility's residential customers. This study investigates whether the utility's marketing communication of energy-efficiency information affects residential customers' behavioural intention of energy-efficiency investments that can contribute to mitigating the energy-efficiency gap.

A multiple regression analysis aims to measure residents' behavioural intention of energy-efficiency investments based on the utility's marketing communication of energy-efficiency information. The constructs of the regression model are based on previous studies on Ajzen's (1991) theory of planned behaviour (TPB), energy efficiency, utilities, and marketing communication. It is essential to note that this study aims to predict the behavioural intention of energy-efficiency investments and not the actual behaviour itself (Ajzen, 1991). Hence, residents' behavioural intention of energy-efficiency investments (BI) is predicted by utility customer satisfaction (CS), perceived energy-efficiency information usefulness (PIU), attitude towards energy efficiency (A), subjective norm (SN), and perceived behavioural control over energy-efficiency investments (PBC).

Our findings suggest that the utilities can leverage marketing communication to increase customer satisfaction, simultaneously incentivising residents to undertake energy-efficiency investments that can contribute to mitigating the energy-efficiency gap. The findings of this study are of interest to utilities who want to optimise their practices regarding marketing communication of energy-efficiency information and energy-efficiency analysts investigating means to mitigate the energy-efficiency gap.

2.0 Literature Review

2.1. The energy-efficiency gap

Energy efficiency has long thrived as a critical element of climate change dialogue. Patterson (1996) refers to energy efficiency as using less energy to produce the same useful output. Energy industry analysts have consistently touted the significant potential of energy efficiency as a win-win opportunity (Allcott & Greenstone, 2012). The win-win argument holds that encouraging residents' energy-efficiency investments can improve welfare by reducing fossil fuel consumption. This would yield economic benefits to the residents by undertaking privately profitable energy-efficiency investments. In this study, energy-efficiency investments may, for example, include insulation upgrades and solar panels and are not to be confused with energy conservation practices, such as adjusting room temperature or switching off lights when leaving a room (Mills & Schleich, 2012; Kastner & Stern, 2015).

Several studies emphasise the economic and environmental saving potential energy efficiency offers. For instance, McKinsey & Company suggests that 835 megatons of carbon dioxide equivalent could be reduced in 2030, at a net savings of over $45 billion (Gillingham & Palmer, 2014). Even though the latter estimate only covers the United States, and it is unclear whether this includes residents as well as businesses, it displays energy efficiency's vast potential. However, it appears that residents' undertaking of such investments is not adequate to the degree that it would be justified, even from an economic perspective (Gerarden et al., 2017).

Jaffe and Stavins (1994) refer to the diffusion of apparently cost-effective energy-efficiency technologies as “the energy paradox”, labelling it as the crux of the debate surrounding the energy-efficiency gap. The energy-efficiency gap and the energy paradox have been used interchangeably (Gillingham & Palmer, 2014). However, the two concepts are distinguished in this study. The energy paradox is defined as “the apparent reality that energy-efficiency technologies that would pay off for adopters are nevertheless not adopted” (Gerarden et al., 2017, p. 1). This basic definition relates to the issue of private optimality and translates to the energy-efficiency gap, which is the existing gap between the actual and optimal level of efficient energy use (Jaffe & Stavins, 1994). The latter definition of the energy-efficiency gap is utilised in this study.

2.1.1. Explanations for the energy-efficiency gap

Several previous studies emphasise attributing explanations for the energy-efficiency gap. In the early ’90s, Jaffe and Stavins (1994) labelled market and non-market failures as explanations for the gradual diffusion of energy-efficient investments. According to Jaffe and Stavins (1994), a set of potential market failures may affect the adoption of energy-efficiency investments, where three of these relate to the availability of information. Jaffe and Stavins (1994) point out that a principal-agent problem arises because it is difficult for the possessor of energy-efficiency information, such as utilities, to convey it credibly to the party that would benefit from energy efficiency, such as residents (Jaffe & Stavins, 1994). Similarly, in a more recent study, Gerarden et al. (2017) divide potential explanations for the energy-efficiency gap into market failures, behavioural anomalies, and model and measurement errors. Within market failures, information problems are again emphasised, especially highlighting asymmetric information and principal-agent problems affecting decisions about adopting energy-efficiency technologies.

Furthermore, challenges related to the diffusion of information from research and development are highlighted regarding information problems as an explanation. (Gerarden et al., 2017). Jaffe and Stavins (1994) emphasise the uneven distribution of information about the benefits and costs of adopting energy-efficient technologies, resulting in suboptimal investment decisions and, ultimately, the energy-efficiency gap. Regarding non-market failure explanations for the energy-efficiency gap, they distinguish uncertainty from

imperfect information and elaborate that “uncertainty about the future energy prices, actual savings from energy efficiency technologies, and the irreversible nature of energy-efficiency investments may result in underinvestment in energy-efficient technologies” (Jaffe & Stavins, 1994, p. 805).

Allcott and Greenstone (2012) define investment inefficiencies as forces that may make consumers not undertake privately profitable investments in energy efficiency measures and highlight two investment inefficiencies. Firstly, imperfect information entails that residents lack complete knowledge about energy-efficient investments or differences in energy efficiency among products or services, potentially leading to uninformed decisions and missed opportunities for profitable energy efficiency. Secondly, inattention refers to when residents or businesses overlook essential factors related to energy efficiency when making purchasing decisions, potentially leading to suboptimal energy consumption patterns, and missed opportunities for savings (Alcott & Greenstone, 2012). Palmer et al. (2013) emphasise that low-hanging fruit exists to improve building energy efficiency, referring to the potential economic and environmental savings this posits.

Households that use more energy than comparable households are more likely to have low-cost energy conservation opportunities of which they are unaware, and many utilities now target energy conservation information to these relatively heavy users (Alcott & Greenstone, 2012). Palmer et al. (2013) further depict the lack of information to explain the energy-efficiency gap and highlight that this information would be particularly important for existing older residents' owners. It is emphasised that audits of homes can provide important information about opportunities for improving energy efficiency (Palmer et al., 2013). However, there is low recognition of audits, significant variability in the cost of audits, and variation in the quality of information from audits.

Similarly to Allcott & Greenstone (2012), Gerarden et al. (2017) elaborate that behavioural anomalies include inattention to energy-efficient alternatives, short-term thinking, limitations in rational decision-making, heuristic decisions, and behavioural patterns influenced by reference points and systematic biases. Modelling flaws include “errors in modelling costs

and energy use for alternative products, omitted product attributes, heterogeneity in benefits and costs of adoption, misuse of discount rates, and uncertainty and irreversibility in adoption decisions" (Gerarden et al., 2017, p. 2). Gillingham and Palmer (2014) also display explanations for the energy-efficiency gap and include market failures and behavioural anomalies as the overall explanations. Within market failures, imperfect information is again emphasised and explained as a factor that may discourage consumer investment in energy-efficient products, potentially impacting decisions on adopting energy efficiency measures (Gillingham & Palmer, 2014). A summary of explanations for the energy-efficiency gap from previous studies is provided in *Table 1*.

Table 1.
Summary of explanations for the energy-efficiency gap

Citation	Explanation categories	Used terms
Allcot and Greenstone (2012)	Imperfect information, inattention.	The energy-efficiency gap
Gerarden et al. (2017)	Market failures (information problems, energy market failures, capital market failures), behavioural anomalies, models, and measurement errors.	Energy-efficiency gap, energy efficiency paradox
Gillingham and Palmer (2014)	Imperfect information, principal-agent issues, credit constraints, learning-by-using, regulatory failures.	Energy-efficiency gap, energy-efficiency paradox
Jaffe and Stavins (1994)	Market failures (information asymmetry), non-market failures (uncertainty and irreversibility, qualitative attributes, consumer heterogeneity, consumer inertia).	Energy-efficiency gap, energy efficiency paradox
Palmer et al. (2013)	Lack of information, ineffective home energy audits (low recognition, high cost, variety in information quality).	Energy-efficiency gap, energy-efficiency information gap

2.2. Utilities' motive to promote energy efficiency

There exist agents that could benefit from involvement in energy efficiency promotion, and today, among these are the utilities (Sousa et al., 2013). In this study, the utility refers to electricity utilities responsible for delivering electric energy to the residents. To understand the utility's motive to promote energy efficiency for residents, it is essential to be familiar with the deregulation of the electricity market. Between 1991 and 2000, the Norwegian electricity market was opened for competition in generation and retailing (Amundsen & Bergman, 2006). The deregulation aimed to introduce competition in the electricity market due to inefficiencies in production, transmission and distribution, and inefficiencies in the market (Bye & Hope, 2005).

After the deregulation, the electricity market in Norway has become consistently more competitive (Von der Fehr & Hansen, 2010). Since the residential customers are free to choose their electricity distributor, the utilities must attract new customers and keep their old ones through means other than kilowatt hours, which any utility can offer. Hence, utilities have obtained new motives in the deregulated electricity market to influence their customers' energy consumption. Therefore, energy utilities often offer residential customers services such as energy consulting and inspection (Henryson et al., 2000). However, a paradox related to utilities' motive to help residents with energy efficiency is recognised (Sousa et al., 2013). Electricity utility industry experts have emphasised that an economic incentive to help their customers become more energy efficient does not exist under regulatory structures. It is argued that a disincentive for utilities regarding energy efficiency promotion exists, relating to a decrease in utility revenue if energy efficiency increases (Kushler et al., 2006).

For natural reasons, electricity utilities possess substantial amounts of competence in energy consumption, and motives exist for sharing this knowledge with their customers, such as increasing customer satisfaction (Henryson et al., 2000). EPSI (2023) surveyed to map customer satisfaction associated with their electricity utility in Norway, with a sample size of 1941 interviews with residential customers. The survey found that residential customers receiving energy-efficiency information are significantly more satisfied (EPSI, 2023). Moreover, Fornara et al. (2016) conducted a study to predict the intention to invest in

household energy efficiency and concluded that informal influence was one of the most powerful predictors. Thus, proposing an opportunity for utilities to increase customer satisfaction and intention of energy-efficiency investments through market energy-efficiency information, the first hypothesis of this study is formulated as follows:

> **Hypothesis 1:** *Utility customer satisfaction is positively correlated with behavioural intention of energy-efficiency investments.*

2.3. The relationship between marketing communication and customer satisfaction

Even before the electricity market deregulation, Gellings (1985) proposed that utilities must give their customers more information to experience better control over their electricity consumption. Today, utilities use marketing communication to provide energy-efficiency information to their residential customers, including advertising campaigns, press announcements, billboards, and information leaflets sent out to customers (Henryson et al., 2000).

It is widely agreed that effective marketing communication can increase customer satisfaction (De Pelsmacker et al., 2010; Kotler et al., 2023; Pickton & Broderick, 2005). Customer satisfaction is "the sense of pleasure a buyer feels when a product's perceived performance matches or exceeds their expectation (Kotler et al., 2023, p. 37). Furthermore, Ndubisi and Wah (2005) regard communication as an underpinning for customer satisfaction. Furthermore, communication serves as one of the foundations of relationship marketing (Ndubisi, 2007). In relationship marketing, communication involves "the formal and informal sharing of meaningful and timely information" (Anderson & Narus, 1990, p. 44). Emphasis is placed on the importance of the shared information being timely, as "timely information fosters trust by contributing to dispute resolution and aligning perceptions and expectations" (Morgan & Hunt, 1994, p. 25). The information must be understandable and arouse emotion, which may motivate action. In the context of energy efficiency, it must be possible to put the information into concrete actions and situations in everyday life. At the same time, the consequences of action must be perceived as close and direct as possible (Henryson et al., 2000).

Furthermore, Gellings (1985) proposes a critical need for better two-way communication to develop a new partnership between utilities and customers. According to Grönroos (2004), not all activities are directly two-way communication, but all communication efforts should lead to a response that maintains and enhances the relationship. Any given effort, such as a sales meeting, direct mail letter or an information package, should be integrated into a planned ongoing process. This planned communication process includes various elements that, for example, can be divided into sales activities, mass communication activities, direct and interactive communication, and public relations. (Grönroos, 2004). Trending in relationship marketing is the integration of communication elements, such as advertising, direct marketing, and sales promotion, which is commonly seen by utilities today (Henryson et al., 2000). Furthermore, Morgan and Hunt (1994) argue that communication is a significant precursor to trust, subsequently aligning with Leninkumar (2017) on customer satisfaction as an antecedent of trust. The importance of marketing communication and the assumption that the shared information in marketing communication must be adequate, timely, and applicable leads to the second hypothesis of this study:

> **Hypothesis 2:** *Perceived energy-efficiency information usefulness is positively correlated with behavioural intention of energy-efficiency investments.*

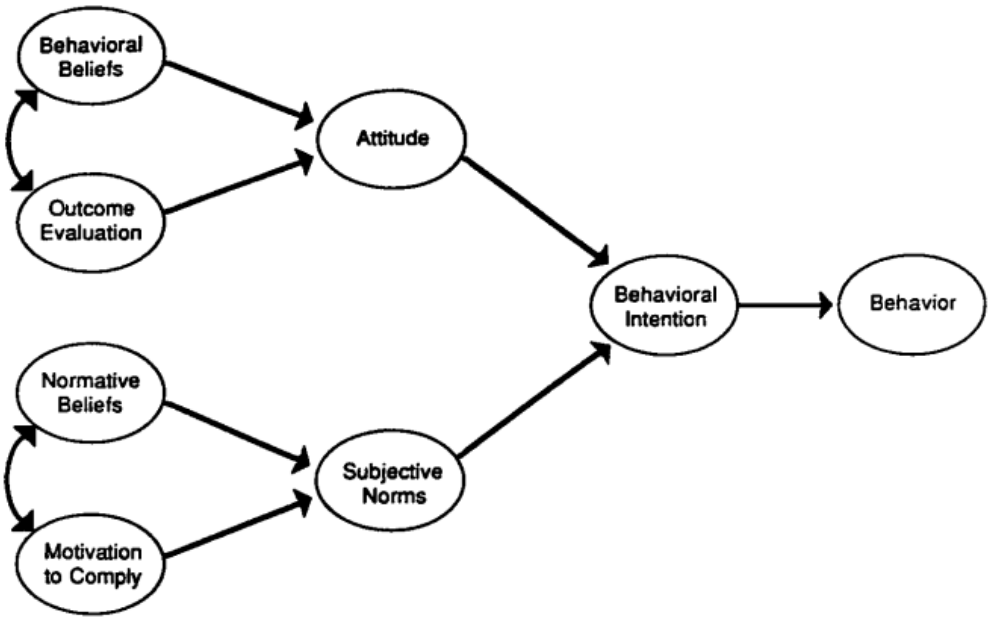
2.4. The theory of planned behaviour in energy efficiency

According to Henryson (2000), information strategies are necessary to increase energy-efficiency investments through a change in people's behaviours. Ajzen (1991) emphasises explaining human behaviour as a difficult task. However, the theory of planned behaviour aims to do just that. Energy-efficiency investments involve a rational process, as TPB posits (Fornara et al., 2016). This study aims to predict residents' intention of energy-efficiency investments, and TPB entails that the direct antecedent of behavioural action is behavioural intention (Ajzen, 1991). Furthermore, TPB postulates three conceptually independent determinants of behavioural intention: attitude, subjective norm, and perceived behavioural control. Supporting the application of TPB in the field of energy-efficiency behaviour,

Abrahamse and Steg (2009) argue that TPB has previously successfully been applied to understanding environmentally related behaviours.

The theory of planned behaviour was born out of the limitations of Ajzen's (1980) previous theory of reasoned action (TRA), which depicts that the intention behind the behaviour itself influences actions (Vallerand et al., 1992). Ajzen (1991) states that "As in the original theory of reasoned action, a central factor in the theory of planned behaviour is the individual's intention to perform a given behaviour" (Ajzen, 1991, p. 181). Ajzen (1991) elaborates that the theory of planned behaviour was made necessary by the original model's limitations, relating to the inconsideration of dealing with behaviours over which people have incomplete volitional control. The theory of reasoned action is illustrated in *Figure 1*.

Figure 1.
The theory of reasoned action

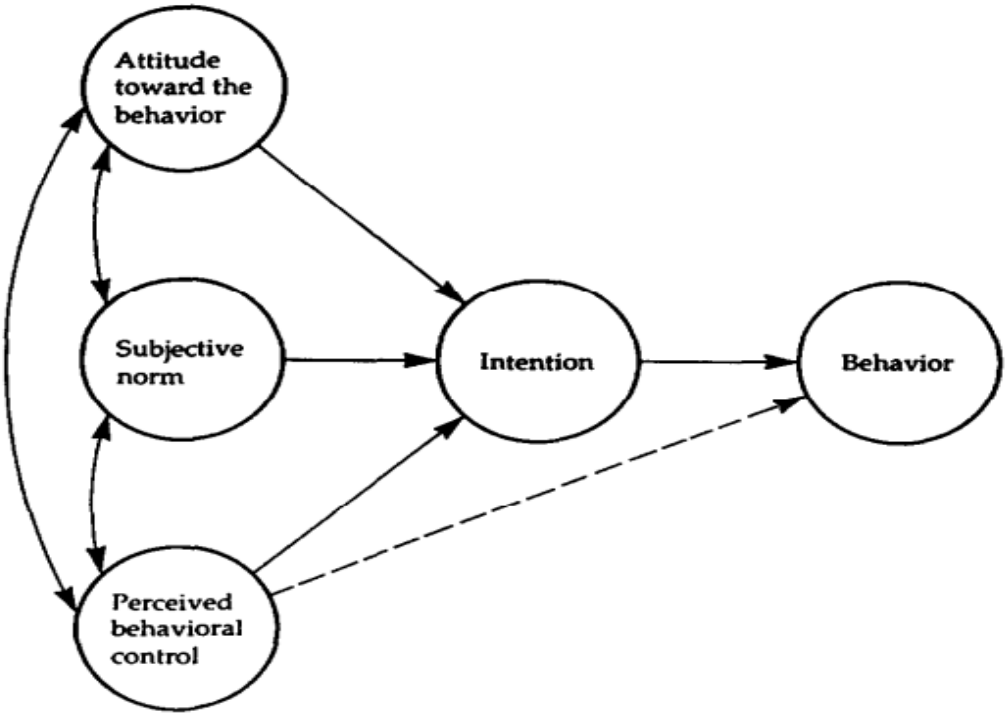


Note. This figure is from the article *"Ajzen and Fishbein's theory of reasoned action as applied to moral behavior: A confirmatory analysis"* (Vallerand, 1992, p. 99).

Thus, an additional component, perceived behavioural control, was added. Notably, perceived behavioural control and attitude often happen to be the determinants most strongly related to pro-environmental behaviours and intentions, such as energy-efficiency investments (Abrahamse & Steg, 2009). Generally, the stronger the intention to engage in a

behaviour, the more likely it should be its performance. However, behavioural intention can only engage expression in behaviour if the behaviour in question is under volitional control and if the person can decide whether to perform or not. Although some behaviours may, in fact, meet this requirement quite well, the performance of most depends at least to some degree on such nonmotivational factors as the availability of requisite opportunities and resources, such as information, competencies, or money (Ajzen, 1991). The theory of planned behaviour (TPB) is illustrated in *Figure 2.*

Figure 2.
The theory of planned behaviour



Note. This figure is retrieved from *"The theory of planned behavior. Organizational behavior and human decision processes* (Ajzen, 1991, p. 182).

The first independent determinant of behavioural intention, attitude, can be defined as "the attitude toward the behaviour and refers to the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question" (Ajzen, 1991, p. 188). Attitudes affect behavioural intentions, which in turn form people's actions, and attitudes towards energy efficiency may explain a share of the variance in the adaptation of energy-efficiency measures (Mills & Schleich, 2012). Furthermore, attitude has proved to be

prominent in predicting pro-environmental behaviour (Abrahamse & Steg, 2009). Thus, the third hypothesis of this study is based on attitude towards energy efficiency:

> **Hypothesis 3:** *Attitude toward energy efficiency is positively correlated with behavioural intention of energy-efficiency investments.*

Furthermore, a subjective norm is defined as "a social factor, referring to the perceived social pressure to perform or not to perform the behaviour" (Ajzen, 1991, p. 188). Within subjective norms, there is a distinction between two types of normative beliefs. These normative beliefs are either injunctive or descriptive, whereas injunctive normative belief is "the expectation or subjective probability that a given referent individual, or group approves or disapproves of performing the behaviour under consideration", and descriptive normative belief being "beliefs as to whether important others themselves perform the behaviour (Ajzen, 2020, p. 315). Previous studies aimed at predicting intention to improve household energy efficiency have highlighted that significant others or neighbours may influence developing beliefs regarding possible outcomes in decision-making processes (Fornara et al., 2016). Thus, the fourth hypothesis of this study is formulated as:

> **Hypothesis 4:** *Subjective norm is positively correlated with behavioural intention of energy-efficiency investments.*

Lastly, perceived behavioural control is described as "the degree of perceived behavioural control which refers to the perceived ease or difficulty of performing the behaviour, and it is assumed to reflect past experience as well as anticipated impediments and obstacles" (Ajzen, 1991, p. 188). In the context of energy efficiency, convenience, competence, time, and economic conditions affect perceived behavioural control, and the determinant has been frequently used to predict environmental behaviours (Wang et al., 2014). Recognised as the most prominent determinant in TPB alongside attitude related to pro-environmental intentions, the fifth hypothesis of this study is therefore formulated as follows:

Hypothesis 5: *Perceived behavioural control is positively correlated with behavioural intention of energy-efficiency investments.*

A research model adapting the constructs of Ajzen's (1991) theory of planned behaviour is made, including a fifth and sixth construct, namely "utility customer satisfaction" and "perceived energy-efficiency information usefulness," illustrated in Figure *3*. Furthermore, a summary of the research hypotheses is found in *Table 2*.

Figure 3.
Research model adapting Ajzen's (1991) TPB

Table 2.
Research hypotheses

Research hypotheses	
H1	Utility customer satisfaction is positively correlated with behavioural intention of energy-efficiency investments.
H2	Perceived energy-efficiency information usefulness is positively correlated with behavioural intention of energy-efficiency investments.
H3	Attitude toward energy efficiency is positively correlated with behavioural intention of energy-efficiency investments.
H4	Subjective norm is positively correlated with behavioural intention of energy-efficiency investments.
H5	Perceived behavioural control is positively correlated with behavioural intention of energy-efficiency investments.

3.0 Methodology

There are typically three research methods to distinguish between: qualitative, quantitative, and mixed-method. Qualitative research involves "data in the form of words as generated from the broad answers to questions in interviews, or from responses to open-ended questions in a questionnaire, or through observation, or from already available information gathered from various sources such as the Internet" (Sekaran & Bougie, 2013, p. 3). Quantitative research involves "data in the form of numbers as generally gathered through structured questions" (Sekaran & Bougie, 2013, p. 3). However, both quantitative and qualitative methods have their limitations. When researching individuals qualitatively, the ability to generalise results is often lost, and when examining many individuals quantitatively, the understanding of each individual diminishes (Creswell & Clark, 2011). This thesis utilises a mixed-method approach, combining both quantitative and qualitative methods.

3.1. Mixed-method approach

Mixed method research involves "the collection or analysis of both quantitative and qualitative data in a single study in which the data are collected concurrently or sequentially, are given a priority, and involve the integration of the data at one or more stages in the process of research" (Creswell et al., 2003, p. 165). Not all research problems warrant a mixed-method approach, and it is important to justify the approach utilised. As mentioned, qualitative and quantitative research provides different perspectives, each with its limitations. Research problems suited for mixed methods are "those in which one data source may be insufficient, results need to be explained, exploratory findings need to be generalised, a second method is needed to enhance a primary method, a theoretical stance needs to be employed, and overall research objective can best be addressed with multiple phases, or projects" (Creswell & Clark, 2011, p. 8).

Regarding the research problem *"How can utilities leverage marketing communication to affect residents' behavioural intention of energy-efficiency investments?"*, there exists two populations of study. The first is the utility itself, and the second is the residential customers. There is a lack of studies conducted on utilities' capability to leverage marketing communication to affect residents' behavioural intention of energy-efficiency investments. Hence, a qualitative, exploratory approach is sufficient to understand the phenomenon (Sekaran & Bougie, 2013). The latter includes interviews with employees of a Norwegian utility who oversee the marketing communication of energy-efficiency information to residents to provide a detailed understanding of the utility's present practices. Additionally, a focus group with representants of their residential customers are conducted to provide a detailed understanding of their perception and interpretation of the energy-efficiency information.

The qualitative research can provide a detailed picture of whether the utility is able to leverage marketing communication to engage their residential customers to undertake energy-efficiency investments and, as a result, mitigate the energy-efficiency gap (Allcott & Greenstone, 2012; Gillingham & Palmer, 2014). However, the qualitative findings are often insufficient to generalise the results (Creswell & Clark, 2011). Thus, concurrently, a survey is

sent to 10,000 of the utility's residential customers, utilising the research model in Figure *3* to test the hypotheses.

The mixed-method approach in this thesis aims to create triangulation, which refers to "the designed use of multiple methods, with offsetting or counteracting biases, in investigations of the same phenomenon to strengthen the validity of inquiry results" (Greene et al., 1989, p. 256). According to Sekaran & Bougie (2013), one can be more confident in a result if using different methods or sources leads to the same results. The purpose of the mixed-method approach is that the quantitative method can offset the limitations of the qualitative, being generalisability, and the qualitative may offset the limitation of the quantitative, being the understanding of individuals (Creswell & Clark, 2011). Thus, through interviews with relevant employees from the utility, focus groups with their customer representatives, and a survey directed towards 10,000 residential customers, a more complete understanding of the research problem can be achieved. It may offer valuable insights into the utility's current strategies' effectiveness and potential pathways for enhancing customer engagement and promoting energy efficiency.

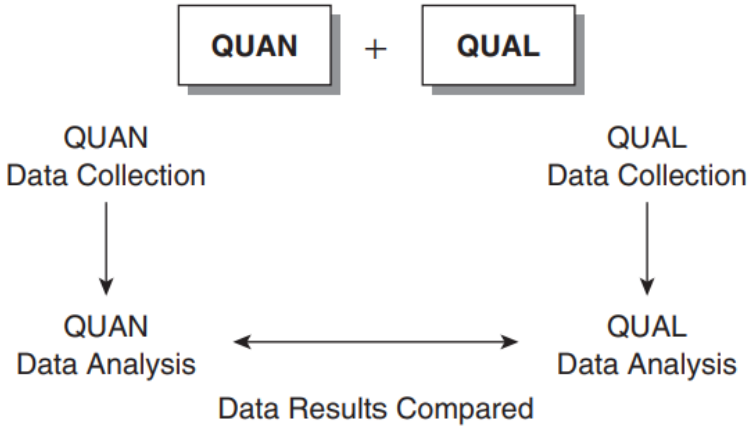
3.1.1. Concurrent triangulation design

This study utilises a triangulation mixed-method design, meaning that the investigator collects both quantitative and qualitative data, merges the data, and utilises the findings to understand the research problem (Tashakkori & Teddlie, 2003). This thesis's specific triangulation mixed-method design proceeds the qualitative and quantitative processes simultaneously, making it a concurrent triangulation design. The concurrent triangulation design is presumably the most known of the major mixed-method designs. The design allows the researcher to use separate quantitative and qualitative methods to offset the weakness inherent in each method (Creswell et al., 2003).

One advantage of the concurrent triangulation design is that it can result in a shorter data collection period than sequential designs. The time efficiency of the concurrent triangulation design has been crucial in collecting both qualitative and quantitative data for this thesis. Furthermore, the concurrent triangulation design is adequate when the priority between

quantitative and qualitative data is equal and a theoretical perspective is present, both of which are the case in this study (Tashakkori & Teddlie, 2003). The concurrent triangulation design is illustrated in *Figure 4*.

Figure 4.
Concurrent triangulation design



Note. This figure is retrieved from *"Advanced mixed. Handbook of mixed methods in social & behavioral research* (Creswell et al., 2003, p. 181).

3.2. Data collection

Semi-structured interviews.

"The semi-structured format is the most frequently used interview technique in qualitative research" (Kallio et al., 2016, p. 2955). Building on the notion that the utility can leverage marketing communication to affect residents' behavioural intention of energy-efficiency investments, gaining knowledge of present practices is crucial. It is known from previous studies that utilities are working to help their customers with the energy efficiency of their residents (Henryson, 2000; Sousa, 2013). However, the interviews can provide nuanced answers about how the utility is practising marketing communication to help their residential customers with energy efficiency, performance, and potential improvements. For this objective, a semi-structured interview is an adequate approach (Harrel & Bradley, 2009; Sekaran & Bougie, 2013). Additionally, the employees may elaborate on the utility's motives for doing so, which can contribute to explaining whether the utility is a good advocate in contributing to mitigating the energy-efficiency gap or not. As these interviews are performed

face-to-face, it is possible to adapt questions as necessary, clarify doubts, and ensure the responses are appropriately understood (Sekaran & Bougie, 2013). Additionally, it enables the researcher to pick up on nonverbal cues from the respondent.

Focus group.

The effect of the marketing communication of energy-efficiency information regarding mitigating the energy-efficiency gap depends heavily on the customers' utilisation of it. As important as it is to gain insights from the utility's perspective of present practices regarding marketing communication of residential energy efficiency, it is just as important to understand their residential customer's perception and interpretation of it. Hence, a focus group is conducted with representatives from the utility's residential customers. Focus groups typically consist of eight to ten participants, with a moderator leading the discussion on a particular topic (Sekaran & Bougie, 2013). Thus, seven residential customers were participating in the focus group. In mixed-method research, a suggested criteria for using focus groups are to explore a topic or collect group language or narratives to be used in later stages (Gill et al., 2008). Thus, a survey was sent to these residential customers beforehand. This determined if the customer was a homeowner or rented the home, what type of housing they owned, and the degree of their interest in energy efficiency.

Survey

A survey is "a system for collecting information from or about people to describe, compare, or explain their knowledge, attitudes, and behaviour" (Sekaran & Bougie, 2013, p. 102). In a business context, surveys are often undertaken on consumer decision-making or customer satisfaction (Sekaran & Bougie, 2013). The survey of this thesis aims to predict the utility's residential customers' behavioural intention of energy-efficiency investments based on the energy-efficiency information they receive. The survey utilises the constructs of the research model, adapting the constructs of the theory of planned behaviour (Ajzen, 1991). Three items are added to each construct, summarised in *Table 3.*

Table 3.
Constructs and items utilised for quantitative data collection and analysis

Constructs and Items	
Utility customer satisfaction:	
CS1	Information on measures to use electricity efficiently is important for my customer satisfaction.
CS2	More information on measures to use electricity efficiently would increase customer satisfaction.
CS3	If the information was more tailored to my home, my customer satisfaction would increase.
Perceived energy-efficiency information usefulness:	
PIU1	Information I receive on measures I can take is relevant to my home.
PIU2	Information I receive on measures I can take could lead to me using electricity more efficiently.
PIU3	The information I receive about what measures I can take could be useful for my finances.
Attitude towards energy efficiency:	
A1	Taking measures to use electricity more efficiently is a sensible investment of my resources.
A2	Taking measures to use electricity more efficiently contributes to a more sustainable future.
A3	I would like more information about what measures I can take to use electricity more efficiently.
Subjective norm:	
SN1	People I know would support me following suggestions on what measures I can take.
SN2	I feel pressure from society to take the measures suggested**.**
SN3	I feel that there is an expectation that I should take measures to use electricity more efficiently.
Perceived behavioural control over energy-efficiency investments:	
PBC1	I have, or can easily obtain, the necessary resources to implement the measures suggested.
PBC2	I have the expertise to understand the information given on what measures I can take.
PBC3	If the information were more tailored to my home**,** I would be able to do measures suggested.
Behavioural intention of energy-efficiency investments:	
BI1	I intend to actively seek information about measures I can take to use electricity more efficient.
BI2	I intend to follow suggestions for measures that will allow me to use electricity more efficiently.
BI3	Based on suggestions, I am going to take measures to use electricity more efficiently.

3.2.1. Sampling

Interviews

As previously mentioned, the interviews were conducted with utility employees. When sampling for interviews, inclusion criteria that specify attributes that cases must possess to qualify for the study were emphasised (Robinson, 2014). Considering the research question, it was essential to interview individuals with adequate knowledge regarding the utility's marketing communication of energy-efficiency information. Additionally, to obtain a

nuanced picture, individuals from different utility departments were interviewed, both male and female. In total, four employees from the utility were interviewed, all related to marketing communication of energy-efficiency information. Furthermore, emphasis on sample sourcing and a sample strategy to specify categories of persons to be included in the sample is imperative (Robinson, 2014). To optimise this process, the sampling strategy included cooperation with a top manager of the utility, who aided in sample sourcing based on the inclusion criteria but did not participate in the interviews. A summary of the interviewees is summarised in *Table 4*.

Table 4.
Demographic Characteristics of Interviewees

Characteristic	*n*	%
Gender		
Male	1	25
Female	3	75
Job title		
Customer Advisor	1	25
Customer Experience Manager	1	25
Customer Dialogue Team Leader	1	25
Communication & Branding Leader	1	25

Note. $N = 4$.

Focus group.

As previously mentioned, a sufficient number of participants in a focus group is generally between eight to ten (Sekaran & Bougie, 2013). Seven participants that satisfied our inclusion criteria were included in the focus group. Before the focus group, 1000 of the utility's residential customers were sent a survey. The survey obligated the respondents to disclose their gender, age, tenure and housing type, adhering to the importance of inclusion criteria (Robinson, 2014). Additionally, on a Likert scale from one to seven, they answered the following statements: *"I am focused on using electricity more efficiently.", "I am interested in information about what measures I can take to use electricity more efficiently."*. The

purpose of the Likert scale questions was to gather a sample that ensured engagement among the participants. However, participants who answered high and low on the Likert scale were included to exclude bias. Furthermore, there exists a rationale for sampling for interview-based research in gaining a sample across a diverse group of cases (Robinson, 2014). Thus, males and females were invited to join the focus group to gather a nuanced picture. Additionally, different ages were wanted, and the focus group finally consisted of individuals, both men and women, ranging from 30 – to 80 years old. The demographic characteristics of focus group participants are presented in *Table 5.*

Table 5.
Demographic Characteristics of Participants

Characteristic	*n*	%
Age at time of focus group (years)		
30-40	2	28.6
41-50	1	14.3
51-60	2	28.6
61-80	2	28.6
Gender		
Male	6	85.7
Female	1	14.3
Tenure status		
Owner	6	85.7
Tenant	1	14.3
Housing type		
Detached house	3	59.6
Apartment	2	25.7
Townhouse/duplex	2	13.4

Note. N = 7.

Survey.

The survey was sent to 10,000 residential customers of the utility. Originally, $N = 757$ respondents participated in the survey, making this a relatively large sample (Field, 2009). However, not all respondents submitted their age, tenure status or housing type. Thus, they were removed from the final sample. Furthermore, the data identified some outliers, which will be further emphasised in the next section. The outliers were removed, to ensure validity and robustness of the data. After outliers and respondents who did not submit age, tenure status or housing type were removed, the final sample consisted of $N = 717$ residential customers. The demographic characteristics of the respondents are further described in *Table 6.*

Table 6.
Demographic Characteristics of Respondents

Characteristic	*n*	%
Age at time of survey (years)		
0-20	2	0.3
21-35	45	6.3
36-50	126	17.6
51-65	306	42.7
66-80	238	33.2
Tenure status		
Owner	672	93.7
Tenant	40	5.6
Other	5	0.7
Housing type		
Detached house	427	59.6
Apartment	184	25.7
Townhouse/duplex	96	13.4
Other	10	1.4

Note. $N = 717$.

3.2.2. Validity and reliability

"Reliability concerns how consistently a measuring instrument measures whatever concept it is measuring" (Sekaran & Bougie, 2013, p. 225). Furthermore, "validity concerns how well an instrument measures the concept it is intended to measure" (Sekaran & Bougie, 2013, p. 225). The nature of the research design, being a mixed method, contributes to the reliability and validity of the study. Collecting various types of information through different sources enhances the reliability of the data and the results (Zohrabi, 2013). However, arguments for reliability in each method, qualitative and quantitative, are presented in this thesis.

It can be argued that the qualitative research of this thesis adheres to both triangulation and constructivism. Triangulation is present due to the involvement of several data sources, interviews and a focus group, strengthening validity and reliability (Golafshani, 2003). Utilising several methods in this qualitative approach also adheres to constructivism, including observation, interviews, and recordings that will enhance the diversity of constructed realities. Collecting data from two distinct groups, utility employees and customers, strengthens the presence of a constructivist focus on multiple realities even further (Golafshani, 2003)

3.2.3. Statistic tests

Statistic tests were initially conducted on an item level, including tests for normality and outliers, to exclude extreme values and ensure robustness in the data before aggregating each construct's items into a new variable to be utilised in the multiple regression. Subsequently, statistic tests were conducted on these variables, thus on a construct level following the aggregation of items, including Cronbach's Alpha, to ensure internal reliability. Thereafter, following the multiple regression analysis, a test for multicollinearity was performed.

Normality

The reasoning for hypothesis testing is based on the assumption of normal distribution. If the assumption of normally distributed data is not satisfied, the underlying logic of hypothesis testing becomes flawed (Field, 2009). To test the assumption of normality, skewness and kurtosis of the data were examined to assess whether the data conform to a normal

distribution. If the data distribution is skewed, the mean will shift toward the extreme values. Consequently, the mean might not offer the most accurate depiction of a typical score. (Kerr et al., 2002). This is categorised as an item-level phenomenon. Thus, normality tests for 18 items were performed. Field (2009) argues that in large samples (200 or more), skewness values should not exceed 2.58. Thus, the threshold for acceptable skewness and kurtosis values was set between -2 and 2. The lowest skewness statistic was -1.174, and the highest was .366. Thus, skewness is not an issue in these data. The lowest kurtosis statistic was -.826, and the highest kurtosis statistic was .782. A summary of these values is displayed in *Table 7.* The testing of skewness and kurtosis supports the assumption of the normality of distributed data, assuring that the normality of the data is not an issue.

Table 7.
Skewness and Kurtosis to test normality

Variable	Skewness	Kurtosis
CS1	-.539	-.222
CS2	-.544	-.365
CS3	-.744	.066
A1	-.1.011	.718
A2	-1.174	.782
A3	-.780	-.335
SN1	-.352	-.244
SN2	.366	-.744
SN3	-.210	-.826
PIU1	-.208	-.392
PIU2	-429	-.459
PIU3	-.497	-.612
PBC1	-.151	-.767
PBC2	-.953	.396
PBC3	-.519	-.333
BI1	-.199	-.803
BI2	-.395	-.501
BI3	-.338	-.635

Note. N = 757.

Outliers

An outlier can be described as a score very different from the rest of the data, and it is important to identify these scores because they bias the model we apply to the data (Field, 2009). Boxplots are a beneficial way to display data and identify outliers. The median is shown at the centre of the plot, surrounded by a box at the top and bottom, illustrating the interquartile range. The whiskers extending from both ends of the box show the highest and lowest values that are not outliers (Kerr et al., 2002). One can use a simple boxplot to examine each single variable, which has been done for these data (Field, 2009). Thus, boxplots for each 18 items were produced and investigated to identify outliers.

Overall, boxplots displayed relatively few outliers. However, four items, A1, A2, SN1 and PBC2, displayed some outliers. The outliers were removed from the data. Subsequentially, a z-score test was initiated. Since our dataset is considerably large, the z-scores were not to be lower than -3.82 or higher than 3.82. The lowest z-score in our data is -3,07315 (PBC2) and the highest is 2,15173 (SN2).

Internal reliability

Cronbach's Alpha was tested on all variables, being constructs, and is, therefore, testing a construct-level phenomenon. In this analysis, an acceptable threshold of Cronbach's Alpha value is set to 0.70, a commonly practised threshold utilised to consider a sufficient measure of reliability or internal consistency (Taber, 2018). All constructs displayed Cronbach's Alpha values over 0.70, except subjective norm (SN) and perceived behavioural control (PBC).

Table 8.
Subjective norm (SN) and perceived behavioural control (PBC) Cronbach's Alpha if items deleted

Variable item	Cronbach's Alpha if Item Deleted
Subjective norms (SN)	
SN1	.765
SN2	.519
SN3	.460
Perceived Behavioural Control (PBC)	
PBC1	.213
PBC2	.532
PBC3	.528

Note. Original Cronbach's Alpha, SN = .694, PBC = .546.

For constructs that do not uphold Cronbach's Alpha values that satisfy the threshold, "Cronbach's Alpha if Item Deleted" values were investigated. Regarding subjective norm (SN), the original Cronbach's Alpha value was .694. If item SN1 is deleted, Cronbach's Alpha values would reach .765. Thus, the item was removed. For PBC, deleting items would not result in any higher Cronbach's Alpha value. This is summarised in *Table 8.* However, it has been argued that the threshold of 0.70 indicates acceptable reliability is not always sufficient and that Cronbach's Alpha values as low as 0.45 can be acceptable (Taber, 2018). Furthermore, PBC is an underpinning of the theory of planned behaviour and is nevertheless included in the regression model. It should be noted that this construct has been included in prior research aiming to predict environmental behaviour (Abrahamsen & Steg, 2009). It should, however, also be noted that for this regression model, PBC does not uphold the Alpha's Cronbach threshold.

Multicollinearity

Independent variables that are strongly correlated, designated as multicollinear, can cause challenges in a multiple regression analysis (Johannessen, 2009). A high degree of collinearity between two or more independent variables raises some issues. Firstly, it makes little sense to include independent variables that are highly correlated as they would not make

a unique contribution to the regression equation (Kerr et al., 2002). Secondly, the difficulty of separating the individual contribution from an independent variable to predict changes in the dependent variable is a concern. To ensure that multicollinearity is not an issue, multicollinearity tests were conducted for each regression (VIF values).

Variance inflation factor (VIF) of 10 and as low as 4 have commonly been utilised as thresholds to indicate excessive multicollinearity (O'Brien, 2007). VIF values under 3 are considered acceptable for these data. As can be seen in *Table 9*, all VIF values are well under 3. Hence, this indicates that multicollinearity is not an issue in our data and exhibits robustness in the results.

Table 9.
Tolerance and VIF-values to test for multicollinearity

Variable	Tolerance	VIF
CS	.407	2.485
A	.389	2.571
SN	.812	1.232
PIU	.440	2.271
PBC	.704	1.420

Note. $N = 717$.

3.3. Data Analysis

3.3.1. Thematic analysis

To analyse the qualitative data, a thematic analysis is conducted. Thematic analysis involves "the searching across a data set – be that several interviews or focus groups – to find repeated

patterns of meaning" (Braun & Clarke, 2006, p. 86). The thematic analysis includes six phases, which are summarised in *Table 10*.

Table 10.
Phases of a thematic analysis

Phase	Description of the process
1. Familiarizing yourself with the data:	Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.
2. Generating initial codes:	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code
3. Searching for themes:	Collating codes into potential themes, gathering all data relevant to each potential theme.
4. Reviewing themes:	Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic map of the analysis.
5. Defining and naming themes:	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme.
6. Producing the report:	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.

Note. This table is retrieved from "*Using thematic analysis in psychology. Qualitative research in* psychology" (Braun & Clarke, 2006, p. 87).

The first phase, involving the transcription and familiarisation of data, involved recording the interviews and the focus group with a tool that automatically transcribed the recording. This streamlined the transcribing process, but the automatic transcription was overviewed and needed some correction. The transcription was read and re-read as the method suggests, followed by noting initial ideas. For the second phase, initial codes were generated, as illustrated below in *Figure 5.*

Figure 5.
Initial coding of extracted data

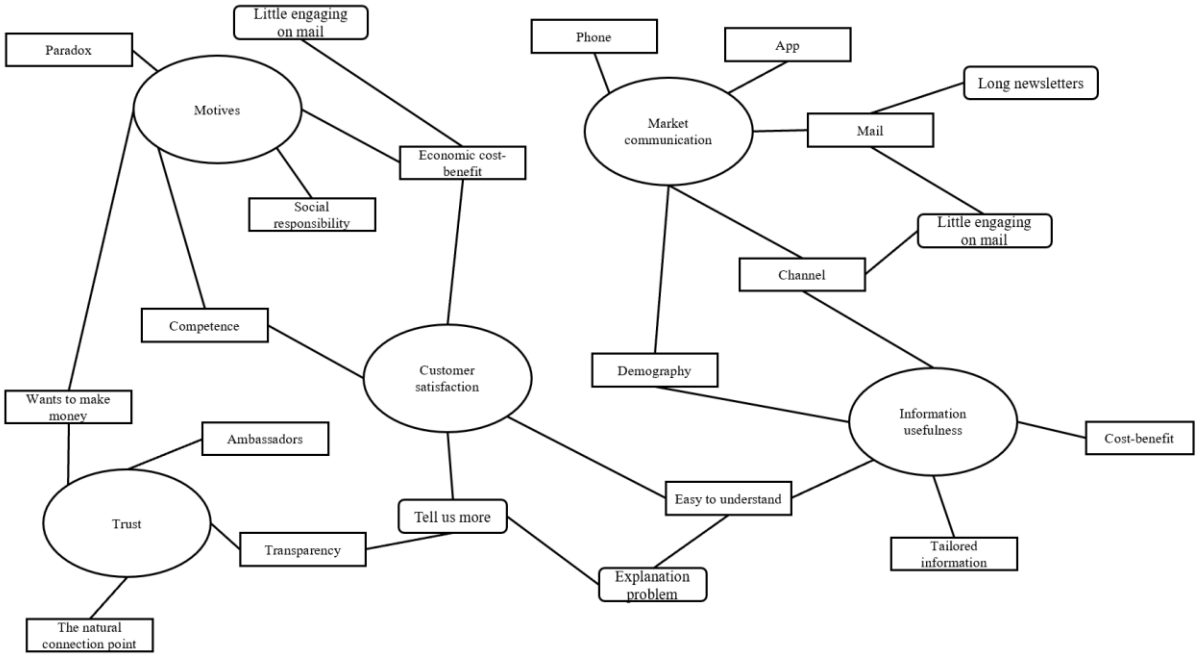
Data extract	Coded for
They would want to earn as much as possible from electricity, you wonder a bit about why they want me to use less electricity. The environmental perspective is important, you must create a change in attitude, go to middle school to teach young people about energy efficiency, corporate responsibility is about making electricity available at the lowest possible price. The electricity supplier has a trust issue, explain more to their customers.	1. Why do they want me to use less electricity? 2. Environmental persp -ective 3. Explain more to custo -mers

Data extract	Coded for
In multiple channels. We use some quite actively, where we are more active than most competitors, a channel to provide tips and advice on how to use electricity smartly. Newsletter once a month, our own websites, a goal to be able to use the app more actively to give more tips.	1. Multiple channels 2. Newsletter, app 3. Use electricity smartly

Note. This figure is based on *based on Braun & Clarke's (2006)* thematic analysis.

The third phase, involving a search for themes, resulted in an initial thematic map, illustrated in *Figure 6.*

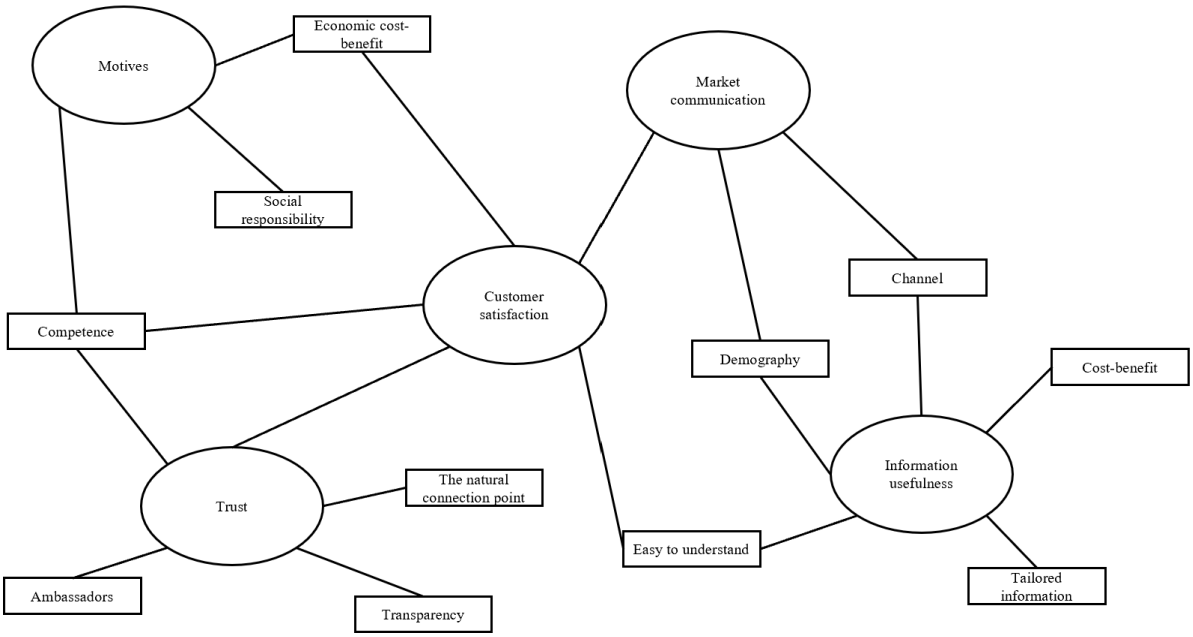
Figure 6.
Initial thematic map



Note. This figure is based on Braun & Clarke's (2006) thematic analysis.

The fourth phase, which included reviewing themes, resulted in a developed version of the thematic map illustrated in *Figure 7.*

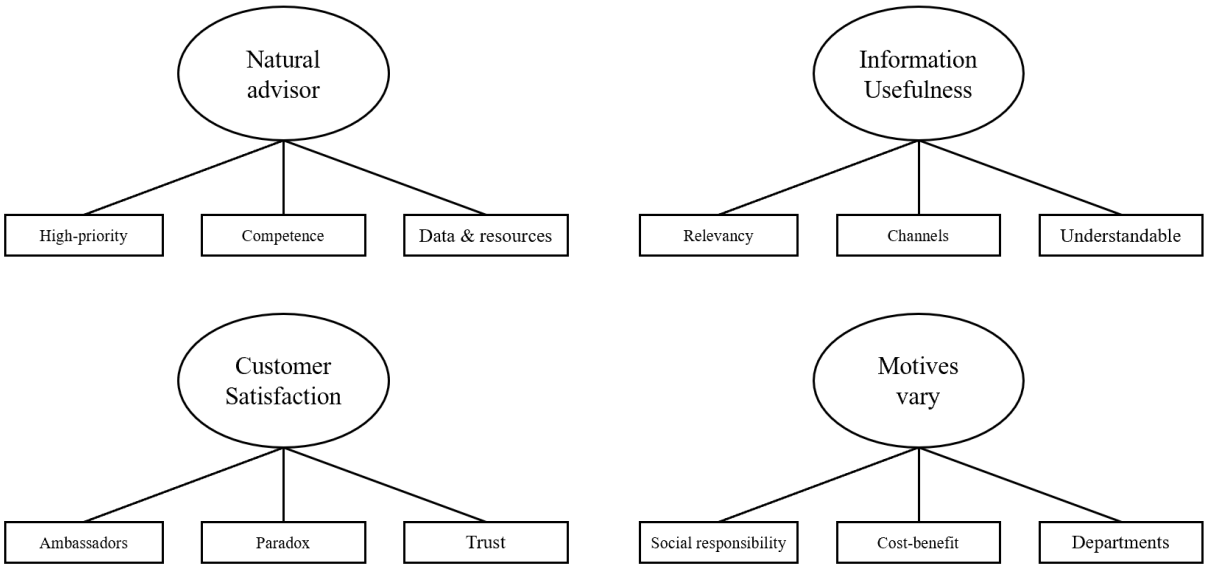
Figure 7.
Developed thematic map



Note. This figure is based on Braun & Clarke's (2006) thematic analysis.

The fifth phase, which resulted in a final version of the thematic map, includes clear definitions and names for each theme, illustrated in *Figure 8.* The sixth phase involves reporting and including the findings in the qualitative findings.

Figure 8.
Final thematic map



Note. This figure is based on Braun & Clarke's (2006) thematic analysis.

3.3.2. Multiple regression analysis

Multiple regression is an extension of simple linear regression where only one variable is included (Field, 2009). In multiple regression, it is possible to make predictions of a dependent variable based on several independent variables. (Kerr et al., 2002). Each independent variable, also called predictor variables, has its own coefficient which helps us understand and predict outcomes. In this study, these include utility customer satisfaction (CS), perceived energy-efficiency information usefulness (PIU), attitude towards energy-efficiency (A), subjective norm (SN), and perceived behavioural control over energy-efficiency investments (PBC). One can predict the dependent variable, also called the outcome variable, from a combination of all variables multiplied by their respective coefficients, plus a residual term (Field, 2009). In this regression, the dependent variable is behavioural intention of energy-efficiency investments (BI). In other words, the multiple regression can predict resident's behavioural intention of energy-efficiency investments.

Multiple regression is appropriate for research questions where the relationship between two or more independent variables and one dependent variable is of interest (Kerr et al., 2002). The regression models in this study adapt the constructs of TPB. Ajzen (2020) elaborates on

the applicability of multiple regression and TPB, stating that "the theory offers a clearly specified structural model, which provides a conceptual framework for thinking about the determinants of the behaviour under consideration and which can be submitted to the empirical test by means of multiple regressions" (Ajzen, 2020, p. 323). Furthermore, the multiple regression analysis permits a thorough investigation of the strengths and significance of each predictor on the behavioural intention of energy-efficiency investments. Additionally, it facilitates control of several other potentially important variables, such as Age, Tenure and Housing type, that are unrelated to the primary interest relationships. This can isolate the effect of the relationships of interest, even when removing the effect of the control variables that have been included, accommodating the robustness of the results. The regression models, including control variables, are listed below.

Model 1: Basic model.

$$Y\ (BI) = \beta_0 + \ \beta_1(CS) + \beta_2(A) + \beta_3(SN) + \beta_4(PIU) + \beta_5(PBC) + \varepsilon$$

Model 2: Controlling for Age, Tenure and Housing type.

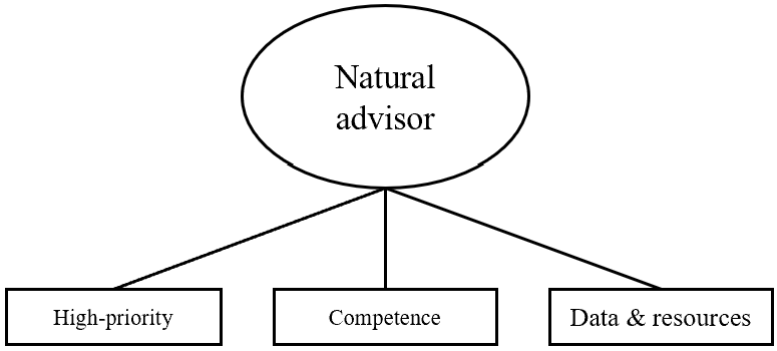
$$Y\ (BI) = \beta_0 + \beta_1(CS) + \beta_2(A) + \beta_3(SN) + \beta_4(PIU) + \beta_5(PBC) + \beta_6(Age) + \beta_7(Tenure) + \beta_8(Housing\ type) + \varepsilon$$

4.0 Findings

4.1. Qualitative findings

Finding 1. The utility is viewed as a natural energy-efficiency advisor

Figure 9.
Main theme 1 from the final thematic map



Note. This figure is based on Braun & Clarke's (2006) thematic analysis.

Providing residential customers with energy-efficiency information emerged as clearly a priority for the utility. One employee in charge of communication stated, *"It is highly prioritised to be able to advise customers on energy efficiency"*. The employee in charge of customer dialogue further elaborated on this, stating *"This (energy-efficiency information) has always been highly prioritised, but now it has become increasingly prioritised, ranking in the top three of what we see customers need. Likely, it will only become more and more relevant."*. The sales employee stated, *"We are closest to it, what we see in electricity. They should rely on us. The natural connection point."*.

It became evident from the interviews with the employees of the utility that they do, in fact, view the utility as a natural energy-efficiency advisor. They highlight that the competence of the staff is comparable to energy advisors. When asked whether they could be compared to energy advisors, one employee from sales stated, *"In the energy advisor class, up there, yes."*. Another employee in charge of customer experiences stated, *"Of everyone who can help, we are quite well-equipped, and it again comes down to whether the customer trusts us.*

We need to be credible and focus on that.". Additionally, several of the employees elaborated that the utility possesses vital parameters and data concerning their customer's energy consumption and is, therefore, equipped to advise them in this regard.

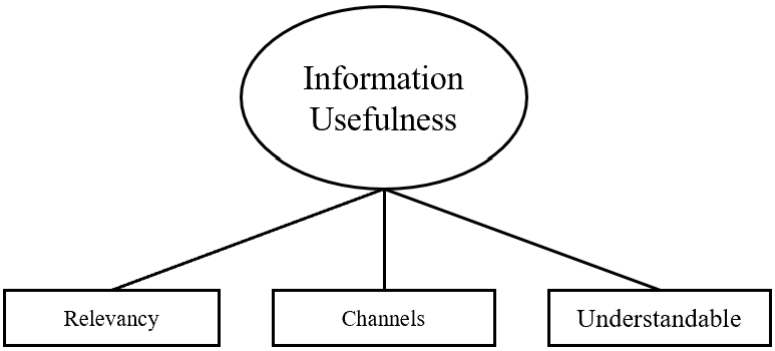
Furthermore, utility employees also elaborated that they interpret that their customers want the energy-efficiency information and, in fact, make use of it. However, several employees mentioned that the content of the advice they give their residential customers often involves energy conservation measures. The latter refers to the little things one can do in everyday life to minimise energy consumption, such as *"washing dishes by hand, turning off excessive electricity consuming appliances"*, as stated by the customer dialogue employee.

Similarly, the utility's customers frequently mentioned that they think the utility has sufficient data and resources to help them with energy efficiency for their households. On the other hand, it was expressed by several of the customers that they experience that the utility has these resources, but however does not use them to their full potential. *"The utility has data on the electricity prices and should be able to help us with this information"* one participant stated. Another articulated, *"The utility can tell us a bit more about electricity because they have an overview of it. They could have been so active that they send out when electricity is cheap and tell different people what to buy for their needs."*

Despite a broad agreement among the customers that they believe the utility is able to help them with energy efficiency, they questioned their motives for doing so. Several of the participants had mentions related to the paradox of as to why a utility would want their customers to use energy more efficiently. One stated, *"You do wonder why they, as an electricity supplier who makes money from me, would want me to use less electricity?"*. Another participant further questioned the motives of the utility regarding helping their customers with energy efficiency, stating, *"When they promote something, it is all about making money".*

Finding 2. Energy-efficiency information usefulness is essential

Figure 10.
Main theme 2 from the final thematic map



Note. This figure is based on Braun & Clarke's (2006) thematic analysis.

According to the utility employees, the value of the energy-efficiency information can be determined by the perceived usefulness customers believe the information has. Furthermore, it emerged that employees believed the energy-information usefulness could be traced to the relevancy it pertains to the receiver. In fact, it became evident that relevancy in the information is needed, surfacing from both the utility employees and their customers' perspectives. One employee in charge of customer experiences stated, *"I think personification makes all the difference".* Furthermore, the same employee elaborated *"One must crack the code on how to get people engaged, which involves making it as understandable and tailored to the customer in the channels they use.".* The employee in charge of communication stated, *"People are more interested when it hits the mark, so personalisation is very important.",* also highlighting the importance of relevancy in the energy-efficiency information. *"I believe the key is to make it so specific that the customer feels we have based it on how they can do it effectively."*, stated the employee in charge of customer experience.

Energy-efficiency information usefulness is seemingly deeply connected to the channels through which the information is communicated. However, there seems to be a diffusion related to what channels the employees think are most effective. The latter may be affected by the department the employees work in, as stated by the employees themselves. In sum, the

channels where marketing communication on energy-efficiency information is communicated include newsletters through e-mail, the utility's website, the utility's app, and social media platforms. The sales employee stated, «*...natural communication on energy efficiency is through phone, never through e-mail.".* The customer dialogue employee supported this claim, stating, *"For that type of information, I would say that the phone might work best because it provides a different type of understanding, and you can brainstorm together to better understand the needs than if it were in writing.".* However, the customer dialogue employee also mentioned that *"There is a decline in phone calls. More people prefer to communicate about such matters via e-mail for better articulation. Older people call, and younger people chat.".* Emerging was also the argument that *"E-mail can be preferred, as you are able to articulate yourself better and more thoroughly.".*

Preferences for which channel energy-efficiency information should be communicated varied among the utility's residential customers as well. Several participants mentioned that they preferred the information through e-mail. One participant, however, stated that *"it is not very engaging when it (energy-efficiency information) comes through the mail.".* One participant said, *"I think I would prefer to be called, actually…",* further elaborating that *"…especially if they have identified a need for me regarding energy efficiency beforehand".* Other participants built upon this statement, one stating, *"It would be nice to have the opportunity to call them if I feel the need for energy-efficiency information.".*

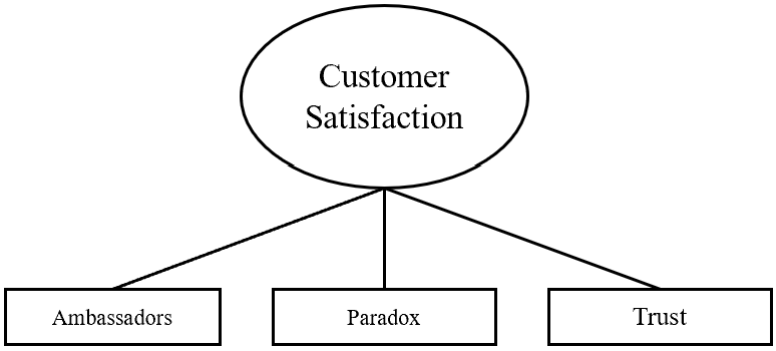
Many participants shared feelings regarding the need for relevancy in the information. *"The utility could have based the information on housing data and consumption and said: Listen, this is what you can do to reduce it."*, one participant stated. Another customer supported the need for relevancy, stating, *"We need relevant expertise that meets different target groups and types of residences people live in.".* More specifically, the need to express the cost-benefit of energy-efficiency investments in the information was also evident, with all residential customers agreeing that this is of utmost importance. One stated, *"Input from the electricity utility would be nice. Reasonable and straightforward to provide us with a good estimate of the costs.".* They further developed this need by expressing, *"Show people how small an investment you actually need to make for an investment",* and *"Cost-benefit must be addressed.".* Furthermore, some participants elaborated on how new technologies can

contribute to the relevancy of the information, stating that "*It is obvious that some artificial intelligence is coming.".*

Finding 3. Energy-efficiency information enhancing customer satisfaction

Figure 11.

Main theme 3 from the final thematic map



Note. This figure is based on Braun & Clarke's (2006) thematic analysis.

Several utility employees discussed the paradox linked to the electricity utility's motive for helping their residential customers with energy efficiency. Adhering to the literature, employees relate this paradox to the assumption that the utility earns more money when the residential customers use more electricity and, therefore, would not benefit from helping them invest in measures that would make them use electricity more efficiently. *"I believe it has been a paradox for a long time, but now it has become such that the price difference from the supplier does not matter",* stated the sales employee. *"Not helping with energy efficiency is not beneficial. We lose credibility, but we earn the same whether the price is high or low."*, states the employee in charge of customer experience. Furthermore, the same employee elaborates, *"We get so much flak; we want people to use electricity smarter for the sake of society",* adding that *"...satisfaction decreases when the customers pay more for the electricity".*

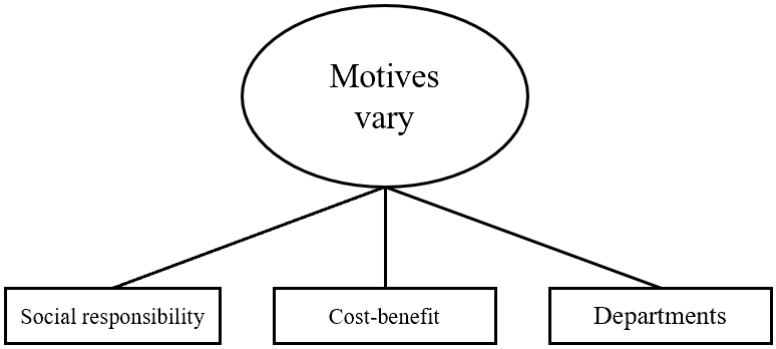
Emerging from the interviews is that providing customers with energy-efficiency information is important for customer satisfaction, which may affect the response to the information. *"We do not make money on doing it, directly. However, it gives us more satisfied customers who function as ambassadors, providing us even more customers."* The sales employee further elaborated *"I think it (energy-efficiency information) increases customer satisfaction greatly if the customer uses the information".* The employee in charge of customer dialogue mentioned that residents' electricity deals make little difference because the price per kWh is so similar between competing utilities today. However, *"Customer satisfaction can be influenced by providing them with a value (energy-efficiency investment opportunities) they did not know they had or would not have discovered themselves".* The same employee further articulated "*The more enlightened, the more value for the customer".* The employee in charge of communication articulated, "*We benefit from having customers who understand and are engaged, and yes, I believe that increases customer satisfaction. Many are dissatisfied because they do not understand high bills and the opportunities to influence them.".*

The residential customers similarly addressed the relationship between energy-efficiency information and customer satisfaction. Overall, the customers stated that receiving energy-efficiency information was important for customer satisfaction. Several based this relationship on the importance of staying up to date, stating, *"It is important to stay updated, so yes, it increases customer satisfaction."*, another supported this by stating, *"It is important to check the market"*. Nevertheless, some customers elaborated that the relationship between energy-efficiency information and their customer satisfaction implied some determinants, relating to benefits and information relevancy. One customer stated, *"If the information had automatically saved me money, my customer satisfaction would rise."*. When addressing customer satisfaction related to energy-efficiency information, the residential customers once again placed emphasis on the usefulness of the information. This implied that the energy-efficiency information is important if the information is relevant to them, thus increasing customer satisfaction.

Finding 4. Motives regarding energy efficiency vary

Figure 12.

Main theme 4 from the final thematic map



Note. This figure is based on Braun & Clarke's (2006) thematic analysis.

"That is the direction we, as a society, must take to achieve our climate goals, a direction society is heading in. It is important to be a leader in this future, which is about positioning and the importance of taking social responsibility, stated the employee in charge of communication. Furthermore, the interviews reveal how internal priorities, and the operational focus of different departments can influence the approach and emphasis on energy efficiency advice. *"We have multiple departments that have different desires regarding how it should be done – whether we should do more or less.",* stated the employee in charge of customer dialogue. *"The sales department is almost disappearing. We need to find ways to utilise the sales department, such as through this.",* stated the sales employee.

Personal and economic factors emerged in the focus group, relating to the motivations behind the customers' engagement with energy-efficiency investments. Evidently, residential customers prioritise comfort (room temperature, isolation) articulating that *"Comfort is important"* as a significant incentive for energy-efficiency investments. Professional obligations also play a role, with some individuals explicitly stating, *"It is a part of my job,"* considering these measures integral to their responsibilities. Health benefits associated with better energy management, such as improved air quality and temperature control, are acknowledged with statements like *"Health benefits,"* further justifying their investments.

However, the fluctuating cost of electricity prominently influences the residential customers' decision-making, with the sentiment that *"The electricity price controls how important energy efficiency is"*, underlining the economic dimension of energy efficiency.

Subjective norm emerges as a critical element, with customers indicating that *"The only way it could have been worthwhile is if someone I trust told me I need to check it out,*" suggesting that energy-efficiency information from trusted sources is crucial in motivating them to consider these measures. Moreover, there appears to be a communication gap between utilities and customers, as evidenced by perceptions of inadequate explanation from utilities, with one customer articulating, *"The utility has an explanation problem!"* Ultimately, the underlying driver for many is financial, highlighted by the straightforward assertion, *"It is all about money."*.

4.2. Quantitative results

The data in *Table 11* indicates that all correlations between the independent variables and BI are positive and significant. Prominently, A displays the highest significant correlation to BI (.72). Furthermore, similarly strong correlations exist between PIU and BI (.71), as well as CS and BI (.67). Additionally, PBC also has a relatively strong correlation with BI (.55). SN has the lowest significant correlation to BI (.42) amongst the independent variables, however still indicating a strong correlation. The data displays relatively high intercorrelations between some of the independent variables as well, such as CS and A (.71), CS and PIU (.68), and A and PIU (.68).

Table 11.
Means, Standard Deviations, and Intercorrelations for Dependent and Independent Variables.

Variable	*M*	*SD*	1	2	3	4	5
Dependent variable							
BI	4.21	1.53	.67***	.72***	.42***	.71***	.55***
Independent variable							
1. CS	4.84	1.46	--	.71***	.40***	.68***	.40***
2. A	5.37	1.35		--	.33***	.67***	.52***
3. SN	3.72	1.58			--	.40***	.22***
4. PIU	4.42	1.53				--	.46***
5. PBC	4.21	1.16					--

Note. ***$p < .001$.

A multiple regression was calculated with "Age," "Tenure," and "Housing type" as the control variables to ensure robustness in the results. These data are displayed in *Table 12*, and it is evident that the results hold even after removing the control variables, as seen in Table *13*, indicating the robustness of the results.

Table 12.
Multiple regression with control variables.

Variable	*B*	*SE B*	*β*	*t*	*p*
CS	.17	.04	.16	4.78	< .001
A	.33	.04	.29	8.29	< .001
SN	.11	.02	.11	4.50	< .001
PIU	.28	.03	.28	8.49	< .001
PBC	.24	.03	.18	7.00	< .001
Age	.002	.003	.012	.539	.590
Tenure	-,059	.122	-.011	-.484	.629
Housing type	.056	.044	.028	1.286	.199

Note. $R^2 = .66$ ($N = 717$, $p < .001$).

A regression analysis summary for independent variables measuring behavioural intention of energy-efficiency investments is found in *Table 13.*

Table 13.
Regression Analysis Summary for Behavioural Intention of Using Energy Efficiency Information to Invest in Energy Efficiency Measures.

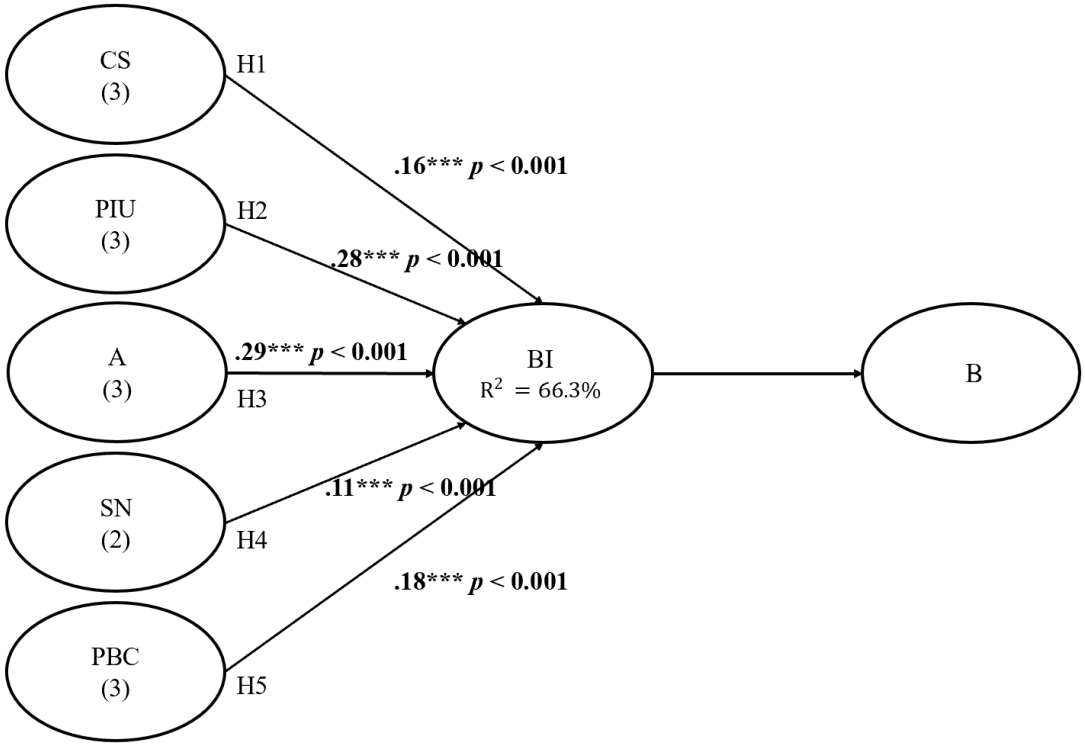
Variable	*B*	*SE B*	*β*	*t*	*p*
CS	.17	.04	.16	4.78	< .001
A	.33	.04	.29	8.29	< .001
SN	.11	.02	.11	4.50	< .001
PIU	.28	.03	.28	8.49	< .001
PBC	.24	.03	.18	7.00	< .001

Note. R^2 = .66 (N = 717, p < .001).

A multiple regression was calculated to predict the behavioural intention of energy-efficiency investments (BI) based on utility customer satisfaction (CS), perceived energy-efficiency information, attitude towards energy efficiency (A), subjective norm (SN) and perceived behavioural control over energy-efficiency investments (PBC). An R^2 of .66 was found, meaning the research model can predict 66% of the variation in the behavioural intention of energy-efficiency investments. Furthermore, the adjusted R^2 was .66 as well.

The multiple regression analysis provides support for hypotheses H1-H5, displaying positive relationships between utility customer satisfaction (β = .16, p < .001), attitude towards energy efficiency (β = .29, p < .001), subjective norm (β = .11, p < .001), perceived energy-efficiency information usefulness (β = .28, p < .001), perceived behavioural control (β = .18, p < .001) and behavioural intention of adapting energy efficiency measures. A summary of hypotheses testing is found in *Figure 13.*

Figure 13.
Hypothesis testing results



5.0 Discussion

This thesis aims to answer the research question, *"How can utilities leverage marketing communication to affect residents' behavioural intention of energy-efficiency investments?"*. Several researchers have sought to explain why the energy-efficiency gap exists, and there is broad agreement among researchers that information problems are at the core of the gap's origin. This study's qualitative and quantitative findings highlight various critical elements that corroborate the literature's explanations of the energy-efficiency gap. Consistent with the literature (Allcott & Greenstone, 2012; Gerarden et al., 2017; Gillingham & Palmer, 2014; Jaffe & Stavins, 1994; Palmer et al., 2013), the qualitative findings underscore the existence of market failures such as imperfect information and behavioural anomalies like inattention and heuristic decisions as significant investment inefficiencies to energy-efficiency investments. Ultimately, these investment inefficiencies warrant advocates in the energy industry that are suitable and equipped to provide trustworthy energy-efficiency information

to residents, where the finding of this, and previous studies, advocate for utilities (Henryson, 2000; Sousa, 2013).

To elaborate on the research question *"How can utilities leverage marketing communication to affect residents' behavioural intention of energy-efficiency investments?"* it is important to assess whether utilities, in fact, are suitable to do so. This is especially important, considering previous studies' recognition of a paradox in utility efforts to help residents with energy efficiency. The recognition of this paradox, relating to an economic disincentive for utilities to promote energy efficiency, such as marketing communication of energy-efficiency information, becomes evident in the qualitative findings of this study (Sousa et al., 2013; Kushler et al., 2006). It became apparent that the utility employees were aware of the proposed paradox and believed this negatively affected customers' interpretation of their marketing communication of energy-efficiency information. The customers substantiate this concern, expressing their doubts regarding the utility's motive to help them undertake energy-efficiency investments with energy-efficiency information. Thus, qualitative findings suggest that the paradox of energy-efficiency promotion, as previous studies have postulated, is a barrier for residents to apply energy-efficiency information provided by utilities.

However, interviews with utility employees indicate that the paradox, stating that utilities earn less if residential customers become more energy efficient, is inaccurate. In fact, emerging from the interviews is that the fluctuation in electricity prices does not affect the utility's earnings and that they benefit more through promoting energy-efficiency investments than if they did not. Furthermore, various factors motivating the utility to promote energy-efficiency investments surfaced in the interviews, such as societal contribution, more educated customers, and increased customer satisfaction. As previous studies emphasise, utilities frequently promote energy-efficiency information in their marketing communication, and their competence in energy consumption advocates them to do so (Henryson et al., 2000; Sousa, 2013).

Despite recognising paradox motives, the qualitative findings indicate that the utility is observed as a natural advisor regarding energy-efficiency investments, both from the

employees' and their customer's perspectives. This is essential because there is a significant relationship between communication and trust, and customer satisfaction is an antecedent of trust (Leninkumar, 2017; Morgan & Hunt, 1994). Thus, qualitative findings sustain the existing belief among utility employees and customers of the utility paradox motives for promoting energy efficiency but illuminate that the paradox is inaccurate. Moreover, to eliminate residential customers' belief in this paradox and enhance trust, findings suggest that the utility can be more transparent in their motives for supporting energy-efficiency investments.

Furthermore, the research question places emphasis on whether the utility can leverage the marketing communication of energy-efficiency information. The leverage implies that the utility has something to gain in return from the practice of promoting energy-efficiency investments, and both qualitative and quantitative findings support this. Literature in marketing communication depicts effective marketing communication as essential to increase customer satisfaction (De Pelsmacker et al., 2010; Kotler et al., 2023; Ndubisi & Wah, 2005; Pickton & Broderick, 2005). Aligning with the literature, it became evident from the interviews with utility employees that increasing customer satisfaction is a clear motive behind the marketing communication of energy-efficiency information. In the focus group, the residential customers confirmed that customer satisfaction is strongly affected by marketing communication of energy-efficiency information.

These qualitative findings are generalised through the multiple regression analysis, showcasing a positive significant relationship between utility customer satisfaction and the customer's behavioural intention to undertake energy-efficiency investments ($\beta = .16$, $p < .001$) based on the energy-efficiency information provided by the utility. Consequently, energy-efficiency information is of great importance for customer satisfaction, and findings indicate that it will rise if the frequency and quality of the information increases, aligning with the literature that emphasises the importance of timely and meaningful communication in relationship marketing and customer satisfaction (Anderson & Narus, 1990; Morgan & Hunt, 1994). Hence, qualitative, and quantitative findings accommodate that utilities can, in fact, leverage the marketing communication of energy-efficiency information to increase customer satisfaction.

The qualitative findings suggest that employees strongly agreed that the effectiveness of marketing communication of energy-efficiency information relies on channelling it to receptive residential customers. Previous studies have also substantiated the importance of targeting residents with specific characteristics (Jaffe & Stavins, 1991; Palmer et al., 2013). Additionally, the qualitative findings showcased a clear distinction between different customers' perceptiveness of the information, indicating a contrast between those customers that should and should not be sent energy-efficiency information. The perceptiveness was severely rooted in the customer's attitude toward energy efficiency. Customers who saw energy efficiency as important for the climate and the economic potential it holds were positive towards the energy-efficiency information, resonating with the win-win opportunity touted by energy analysts, implying improved welfare through reducing fossil fuel consumption and increased economic benefits for residents (Allcott & Greenstone, 2012).

Concurrently, the multiple regression analysis displayed that attitude towards energy efficiency had the strongest correlation to residents' behavioural intention of energy-efficiency investments and could best explain the variance in behavioural intention of energy-efficiency investments ($\beta = .29$, $p < .001$). Consequently, this supports the hypothesis that utility customer satisfaction is positively correlated with residents' behavioural intention of energy-efficiency investments. Hence, qualitative and quantitative findings suggest that emphasis should be placed on targeting residents with a positive attitude towards energy efficiency with marketing communication of energy-efficiency information.

The employees agreed that an important factor in the effectiveness of energy-efficiency information is its usefulness, relating to relevancy for the receiver and the channels it is distributed through. Customers strongly agree that relevant information is crucial for them to intend energy-efficiency investments, and they indicated a clear gap between preferred and perceived energy-efficiency information usefulness today. The latter resonates with Jaffe and Stavins's (1994) emphasis on the difficulties for the possessor of energy-efficiency information related to conveying it credibly to the party that would benefit from energy efficiency (Jaffe & Stavins, 1994). Similarly, the utility employees were aware of this challenge, marking it as a potential area of improvement. Moreover, the qualitative findings

indicate a diffusion amongst the utility employees regarding the channels most effective for distributing energy-efficiency information, also evident among the residential customers. However, both utility employees and residential customers agreed that two-way communication is preferred, aligning with Grönroos' (2004) emphasis on the importance of two-way communication.

The multiple regression analysis illuminated that perceived energy-efficiency information usefulness had a significantly strong correlation to behavioural intention of efficiency-efficiency investments and could explain a relatively large proportion of the variance in the dependent variable ($\beta = .28$, $p < .001$). This indicates an opportunity for the utility to increase customer satisfaction and residents' behavioural intention of energy-efficiency investments by enhancing information relevancy and channel distribution of energy-efficiency information. Henryson et al. (2000) substantiate this finding, emphasising that the information must be understandable and arouse emotion to motivate action. Therefore, it must be possible to put the information into concrete actions and situations in everyday life. At the same time, it is important that the consequences of action are perceived as close and direct as possible (Henryson et al., 2000). More specifically, the utility's customers warrant information on the cost-benefit of energy-efficiency measure investments. Similarly, Jaffe and Stavins (1994) emphasise the uneven distribution of information about the benefits and costs of adopting energy-efficient technologies, resulting in suboptimal investment decisions and, ultimately, the energy-efficiency gap.

Utility employees express that there exists a potential to communicate more specific cost-benefit scenarios regarding energy-efficiency investments. The latter resonates with Gerarden et al. (2017) explanation for the energy-efficiency gap, including "errors in modelling costs and energy use for alternative products, omitted product attributes, heterogeneity in benefits and costs of adoption, misuse of discount rates, and uncertainty and irreversibility in adoption decisions" (Gerarden et al., 2017, p. 2). Thus, findings corroborate with existing literature, necessitating cost-benefit emphasis in the marketing communication of energy-efficiency information as a specific measure that can enhance the perceived usefulness of energy-efficiency information.

Quantitative findings support the hypothesis that subjective norm is positively correlated with behavioural intention of energy-efficiency investments. However, subjective norm could only explain a modest share of the variance in residents' behavioural intention of energy-efficiency investments ($\beta = .11$, $p < .001$). Nevertheless, one of the residential customers expressed the importance of receiving energy-efficiency information from someone close, resonating with the argument that significant others or neighbours may influence developing beliefs regarding possible outcomes in decision-making processes (Fornara et al., 2016).

Even though subjective norm is significant and positively correlated with behavioural intention of energy-efficiency investments based on energy-efficiency information from utilities, findings suggest other determinants such as attitude towards energy efficiency and perceived energy-efficiency information usefulness should be emphasised. Furthermore, perceived behavioural control has previously surfaced among the most significant determinants of energy-efficiency behaviour when applying the TPB (Abrahamse & Steg, 2009; Wang et al., 2014). Aligning with previous studies, findings indicate that perceived behavioural control is significant and positively correlated to behavioural intention of energy-efficiency investments (($\beta = .18$, $p < .001$).

Altogether, the constructs of the research model are well-represented in the regression model and can explain a significant proportion of the variance in residents' behavioural intention of energy-efficiency investments, specifically 66%. Consequently, the concurrent triangulation design has allowed the multiple regression analysis to offset the limitations of the interviews and the focus group, being generalisation, whereas the qualitative findings provide a deeper understanding of utility employees' and residential customers' perspectives (Creswell & Clarke, 2011)

6.0 Conclusion

This study aimed to investigate whether utilities' marketing communication of energy-efficiency information can affect residents' behavioural intention of undertaking energy-efficiency investments, consequently, mitigating the energy-efficiency gap. The research question was *"How can utilities leverage marketing communication to affect residents' behavioural intention of energy-efficiency investments?".* A mixed-method approach, comprising qualitative and quantitative research, included interviews with employees of a Norwegian utility, a focus group with the utility's residential customers and a survey accounting data from $N = 717$ of their residential customers. The qualitative data provided a detailed understanding of the utility's ability to leverage marketing communication to affect residents' behavioural intention of energy-efficiency investments. Concurrently, a regression model was made to generalise the findings by measuring residents' behavioural intention of energy-efficiency investments based on energy-efficiency information from the utility.

Previous studies postulate investment inefficiencies as attributing explanations for the energy-efficiency gap, including market failures, behavioural anomalies, and model and measurement errors, electricity prices, are substantiated by this study. The qualitative findings of this study predominantly highlight information problems as the main investment inefficiencies. However, utility employees and residential customers believe that the utility is a suitable advocate for incentivising energy-efficiency investments through marketing communication of energy-efficiency information, which can increase customer satisfaction. The quantitative findings further generalise how the utility can leverage marketing communication to affect residents' behavioural intention of energy-efficiency investments. The findings suggest that the behavioural intention of energy-efficiency investments is strongly related to residents' attitudes towards energy-efficiency and perceived energy-efficiency information usefulness. Thus, the study urges utilities to segment residents with a positive attitude towards energy efficiency and enhance the relevancy and channelling of energy-efficiency information distributed towards them.

All hypotheses in this study were supported. The quantitative findings utilising a research model adapting the constructs of TPB support that customers' behavioural intention of investing in energy efficiency measures is positively related to *utility customer satisfaction,*

attitude toward energy efficiency, *subjective norm*, *perceived energy-efficiency information usefulness and perceived behavioural control*. In conclusion, this study substantiates that the utility can leverage marketing communication of energy-efficiency information to increase customer satisfaction and, through optimisation of information relevancy and targeting, simultaneously bridge the energy-efficiency gap by increasing the number of energy efficiency measure investments.

6.1 Research limitations

This study on how utilities can leverage marketing communication to affect residents' behavioural intention of energy-efficiency investments provides important insights, yet there are inherent limitations due to the data collection being restricted to employees and customers of only one utility. This constraint has implications for the generalisability and scope of the findings. Focusing on a single utility may not capture the diversity of practices, perceptions, and challenges across the broader utility industry. Utilities may vary significantly in size, resources, regulatory environments, and customer demographics. The strategies and effectiveness of marketing communication in one utility might not be applicable or as effective in another context where different conditions prevail. Thus, this limitation restricts the ability to broadly generalise the study's conclusions to all utilities, particularly those that operate in significantly different regulatory or market conditions.

Furthermore, homogeneity exists in the samples, consisting of employees and customers from one utility, which could lead to biases in the data. Employees and customers associated with one utility may share similar biases or perspectives about their experiences with its corporate culture and market strategies. These shared perspectives might not necessarily reflect the broader range of opinions and experiences that could be encountered in a more diverse sample set. This can affect the reliability of the findings, as the specific organisational and customer culture of the single utility studied shapes them. Moreover, this study explicitly focuses on the behavioural intention of undertaking energy-efficiency investments, and not the actual behaviour itself. Thus, findings are not sufficient to adequately predict whether residents, in fact, will act upon the energy-efficiency information by utilities.

6.2 Implications for utilities and further research

Practical implications for utilities

Qualitative findings illuminate that residents recognise a paradox related to the utility's efforts to help them undertake energy-efficiency investments. However, utility employees argue that the latter paradox is inaccurate. This indicates an opportunity for utilities to foster transparency regarding their motives for marketing communication of energy-efficiency information, potentially increasing residents' trust in the energy-efficiency information.

The findings in this study indicate that utilities should try to segment customers with a positive attitude toward energy efficiency to enhance the likelihood of engaging in energy-efficiency investments based on energy-efficiency information. As this and previous studies suggest, challenges exist in conveying energy-efficiency information credibly to residents who would benefit from it (Jaffe & Stavins, 1994). Preceding increased segmentation efforts, the utility should target these residents with marketing communication of energy-efficiency information.

Furthermore, findings suggest that utilities should make efforts to enhance the relevance of the energy-efficiency information to the residents to which it is communicated, implying information tailored to their specific residence. More specifically, emphasis is placed on communicating the cost-benefit of energy-efficiency investments. Additionally, utilities should ensure that their marketing communication of energy-efficiency information is sent through the recipients' preferred channels. A summary of practical implications for utilities and further research is outlined in *Table 14.*

Table 14.
Practical implications

Practical implications	
Implications for utilities	(1) Foster transparency regarding the utility's motive for marketing communication of energy-efficiency information to residents. (2) Segment residential customers with a positive attitude toward energy efficiency and target them with marketing communications of energy-efficiency information. (3) Enhance the relevancy of the energy-efficiency information in the marketing communication for the receiving residential customers. (4) Investigate what channels residential customers prefer to receive the information through and communicate the energy-efficiency information through the preferred channels.
Implications for further research	(1) Expand the scope to include multiple utilities when conducting research on how utilities can leverage market communication to affect residents' behavioural intention of energy-efficiency investments. (2) Expand the research model by adding behaviour to the constructs to measure residents' actual undertaking of energy-efficiency investments based on energy-efficiency information from the utility, applying structural equation modelling.

Implications for further research

Firstly, implications for further research on how utilities can leverage marketing communication to affect residents' behavioural intention of energy-efficiency investments could benefit significantly from expanding the scope to include multiple utilities. Researching across various utilities has the potential to enhance the generalisability and robustness of the findings. Secondly, as the research limitations suggests, this study only encompasses the behavioural intention of energy-efficiency investments, and not the actual behavioural of undertaking energy-efficiency investments itself. Thus, implications for further research entails the investigation of whether residents in fact undertake energy-efficiency investments based on marketing communication of energy-efficiency information by the utility.

The structural model of the theory of planned behaviour (TPB) provides researchers with a conceptual framework for considering various determinants for specific behaviours, such as the behaviour of undertaking energy-efficiency investments (Ajzen, 2020). Both multiple regressions and structural equation modelling are adequate to test determinants of behaviour, such as the multiple regression in this study. Hence, implications for further research should emphasise the utilisation of structural modelling as well, which can be applicated in line with the second implication related to investigating the actual behaviour of undertaking energy-efficiency investments.

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Appendices

Appendix A – Qualitative resources

Table A1.
Interview guide (Semi-structured interviews)

Question order	Question
Q1	*How do you communicate with customers regarding energy efficiency today?*
Q2	*Can you elaborate on the content of the energy-efficiency information you send to your residential customers?*
Q3	*How is this information communicated today? (word choice, etc.)*
Q4	*What channels are used to send information about energy efficiency to your electricity customers (social media, email, etc.)?*
Q5	*What is the purpose of providing electricity customers with information on how to use energy more efficiently?*
Q6	*Of all the information you share with electricity customers, is information about energy efficiency prioritized?*
Q7	*Are there any internal or external factors that affect how much information you share about energy efficiency?*
Q8	*Do you find that electricity customers absorb and use the information you share about energy efficiency?*
Q9	*Do you believe that as electricity providers, you are able to leverage communication to make homes more energy efficient?*

Table A2.
Interview guide (Focus group)

Question order	*Question*
Q1	*Is there anyone here who has implemented energy measures in their home?*
Q2	*Has anyone experienced the utility trying to help you with implementing energy measures?*
Q3	*What kind of information have you received from the utility about energy measures you can take?*
Q4	*What could motivate you to implement energy measures in your home?*
Q5	*What are the biggest barriers to not investing in energy measures for your home?*
Q6	*Do you find the information you receive about what measures you can take relevant to your home?*
Q7	*Which channel would you prefer to receive the energy-efficiency information in?*
Q8	*Are there any changes you think the utility should make for you to use the information to invest in energy measures?*
Q9	*If you were the utility, what would you do to get people to do energy-efficiency investments?*

Appendix B – Descriptive statistics

Table B1.
Data filtering

	Removed observations	*Remaining observations*
Original observations		757
(1) Did not submit age	18	739
(2) Did not submit tenure status	2	737
(3) Did not submit housing type	2	735
(4) Outliers	18	717
Final sample size		717

Appendix C – Statistic validity and reliability

Table C1.
Outliers from Boxplots

Variable item	*n*
Attitude (A)	
A1	4
A2	4
Subjective norms (SN)	
SN1	10
Perceived Behavioural Control (PBC)	
PBC2	4

Note. Some outliers appear in several variable items. $N = 18$

Figure C1.
Boxplot test for A1

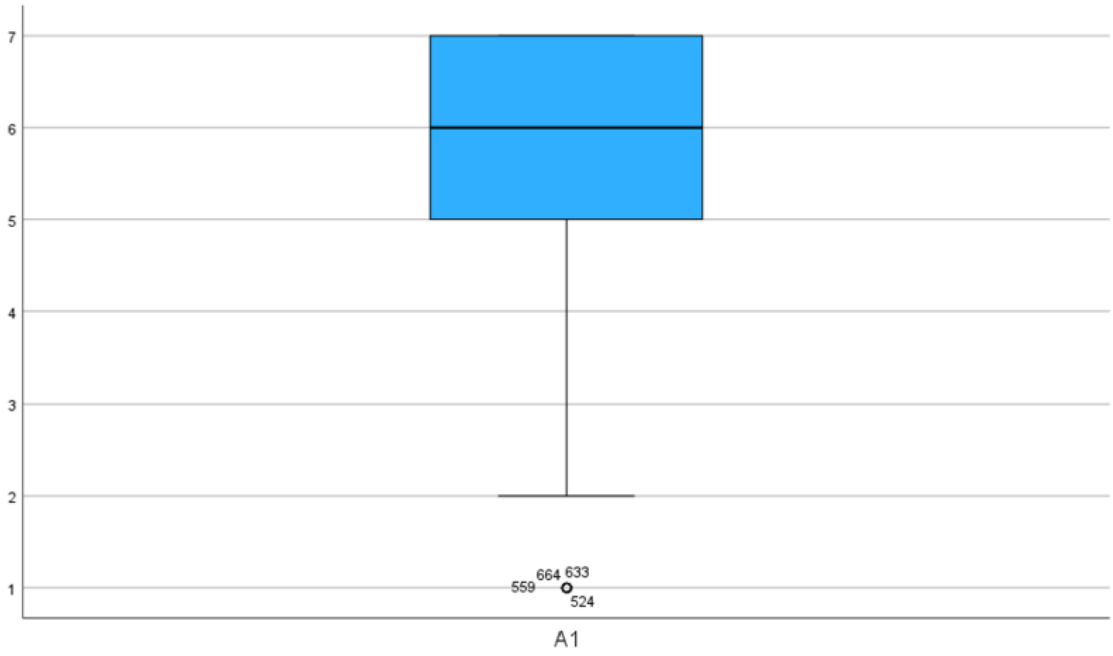


Figure C2.
Boxplot test for A2

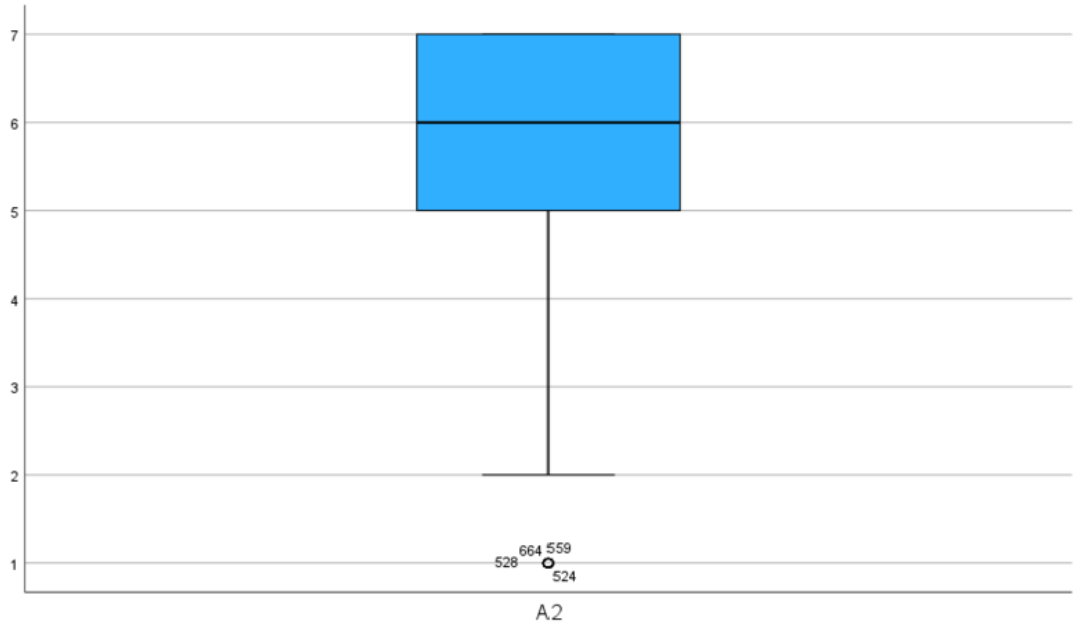


Figure C3.
Boxplot test for SN1

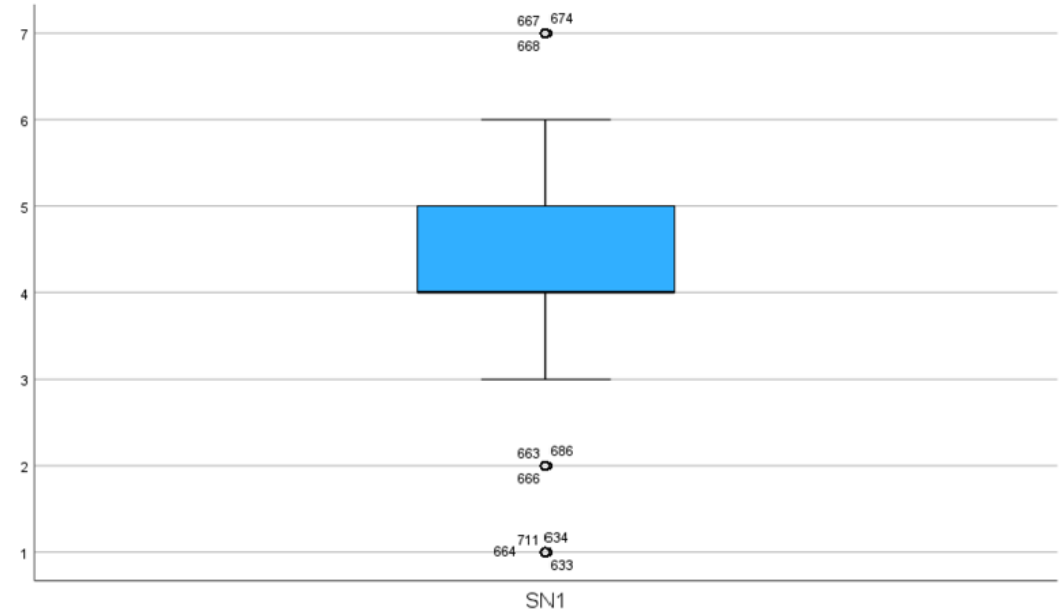


Figure C4
Boxplot test for PBC2

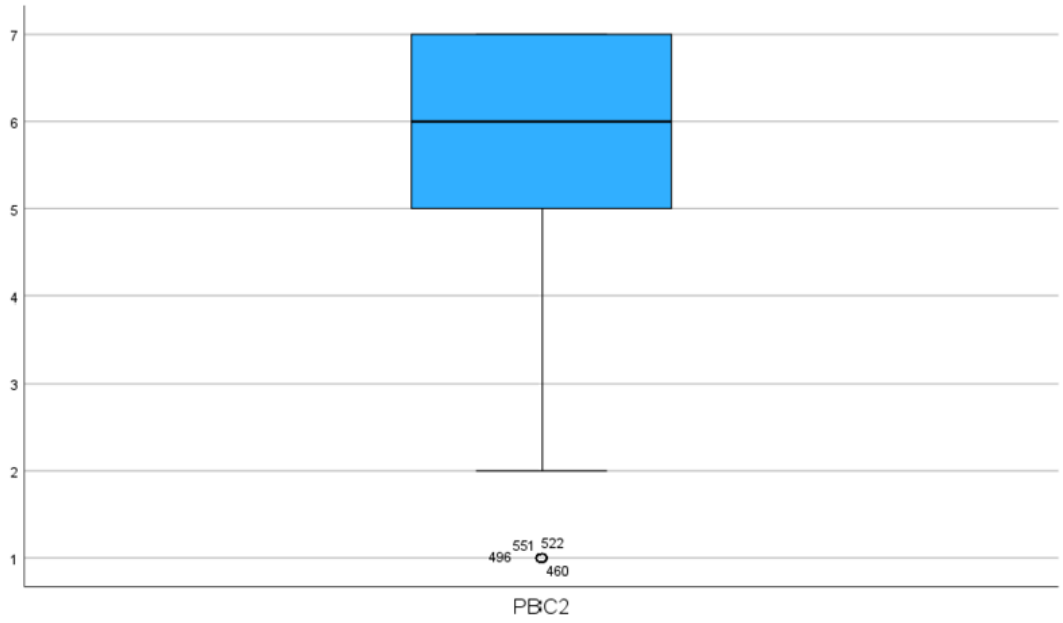


Table C2.
Z-score test

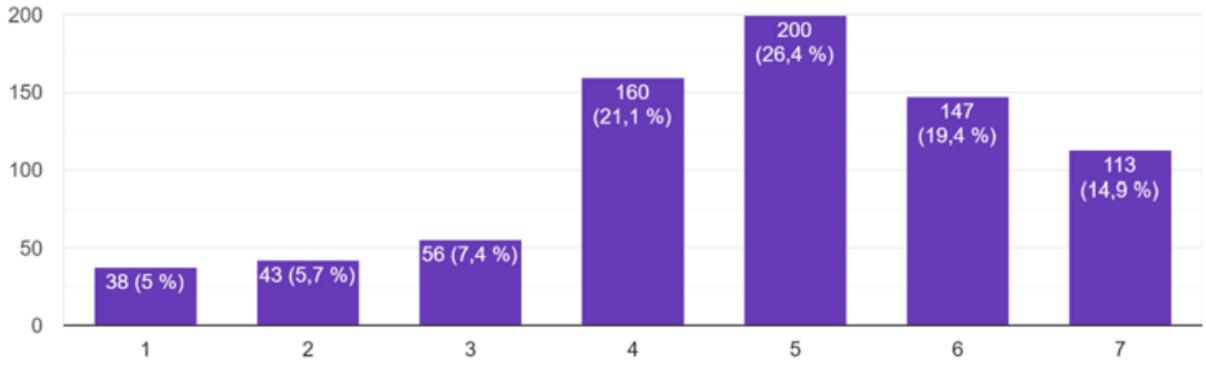
Variable	Minimum	Maximum
CS1 (Z-score)	-2.352	1.422
CS2 (Z-score)	-2.248	1.392
CS3 (Z-score)	-2.609	1.236
A1 (Z-score)	-3.142	1.055
A2 (Z-score)	-2.955	.917
A3 (Z-score)	-2.256	1.098
SN1 (Z-score)	-2.126	1.707
SN2 (Z-score)	-1.279	2.152
SN3 (Z-score)	-1.814	1.574
PIU1 (Z-score)	-1.996	1.817
PIU2 (Z-score)	-2.064	1.586
PIU3 (Z-score)	-2.134	1.307
PBC1 (Z-score)	-1.821	1.678
PBC2 (Z-score)	-3.073	1.049
PBC3 (Z-score)	-2.243	1.496
BI1(Z-score)	-1.802	1.660
BI2 (Z-score)	-2.042	1.640
BI3 (Z-score)	-1.882	1.663

Note. $N = 757$.

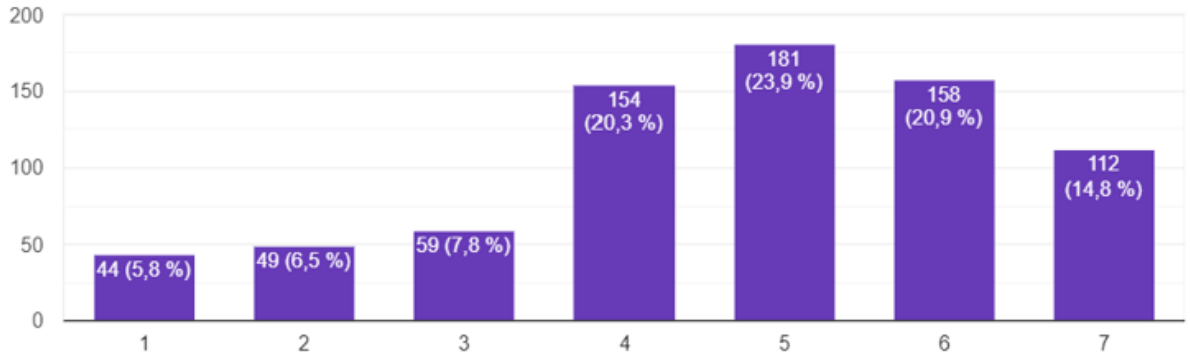
Appendix D – Survey results

Figure D1.
Customer satisfaction

CS1. Information on measures to use electricity efficiently is important for my customer satisfaction.



CS2. More information on measures to use electricity efficiently would increase customer satisfaction.



CS3. If the information was more tailored to my home, my customer satisfaction would increase.

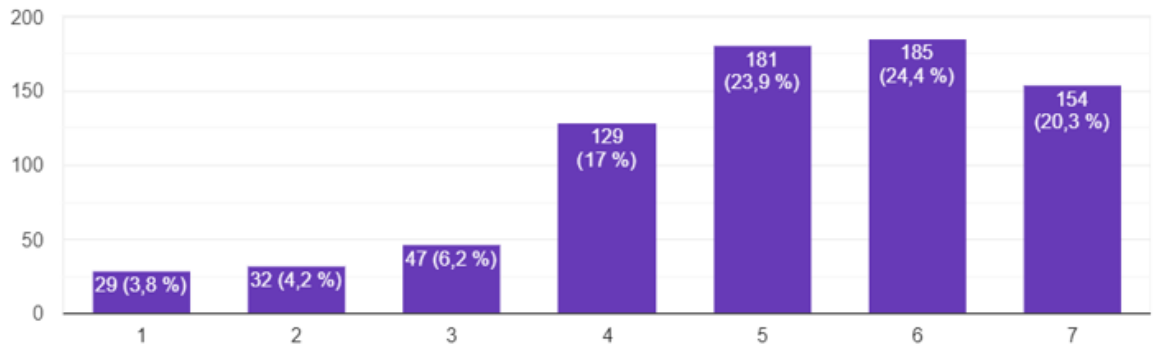
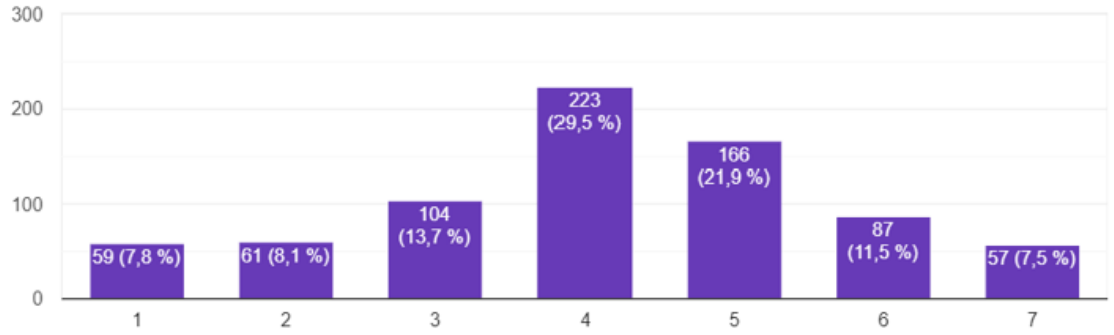
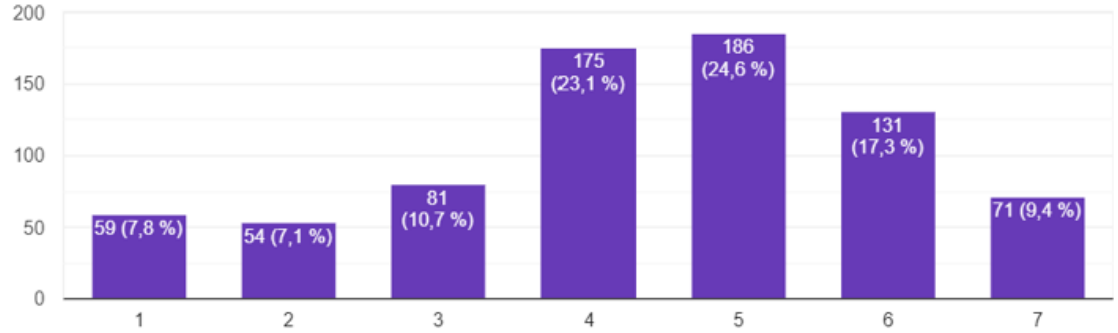


Figure D2.
Perceived energy-efficiency information usefulness

PIU1. Information I receive on measures I can take is relevant to my home.



PIU2. Information I receive on measures I can take could lead to me using electricity more efficiently.



PIU3. The information I receive about what measures I can take could be useful for my finances.

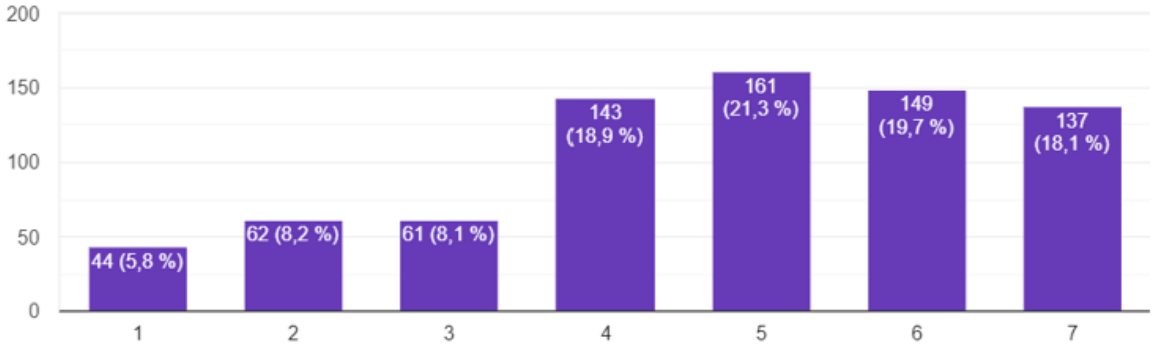
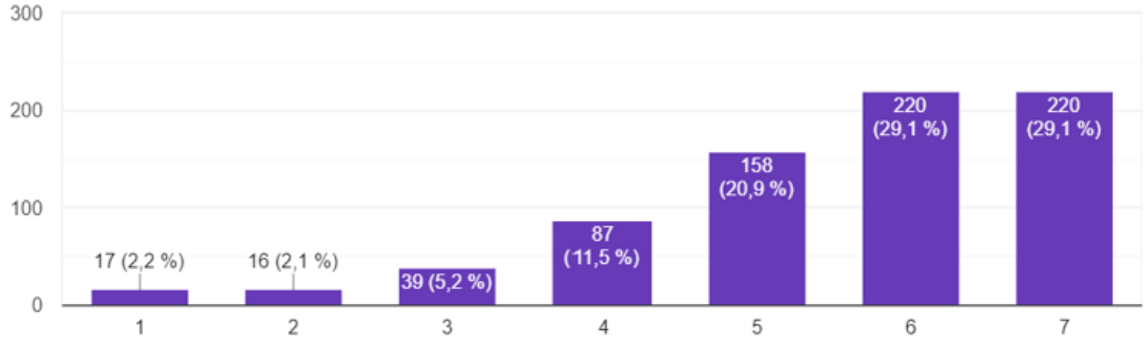
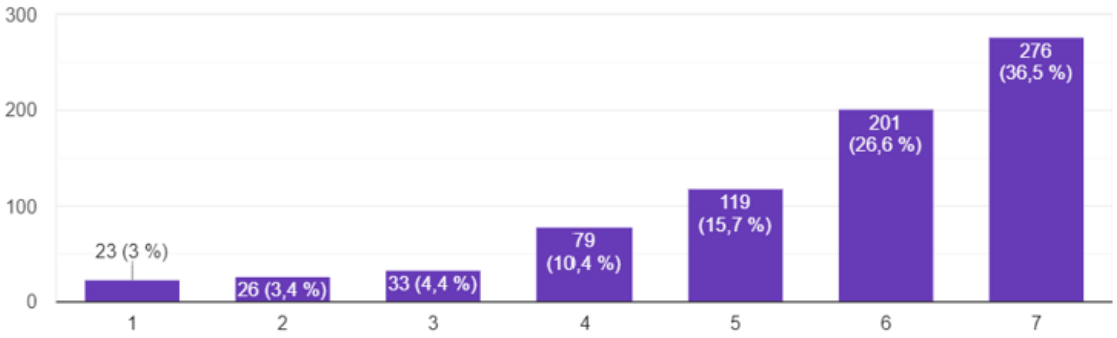


Figure D3.
Attitude toward energy efficiency

A1. Taking measures to use electricity more efficiently is a sensible investment of my resources.



A2. Taking measures to use electricity more efficiently contributes to a more sustainable future.



A3. I would like more information about what measures I can take to use electricity more efficiently.

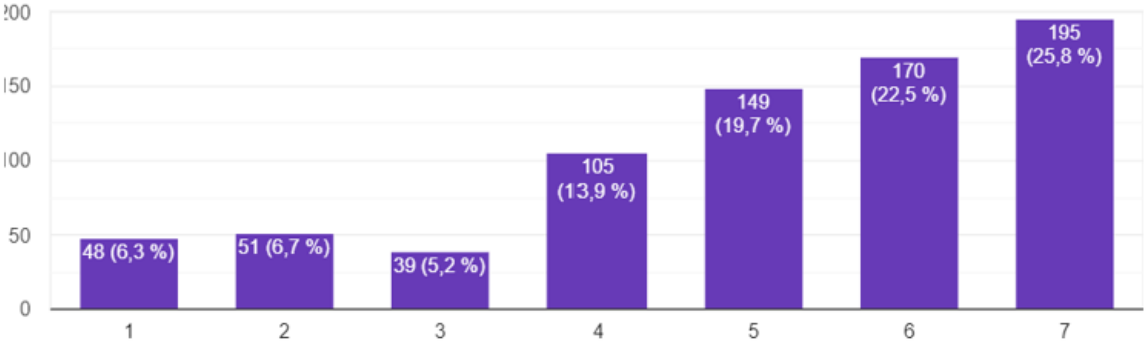
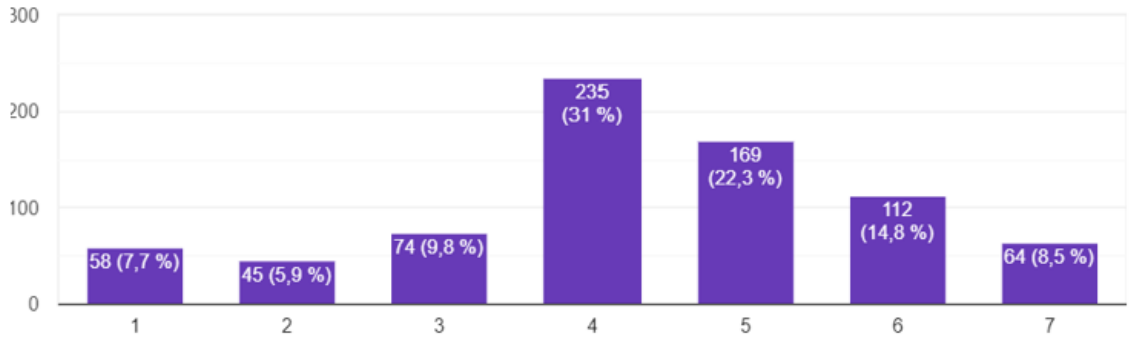
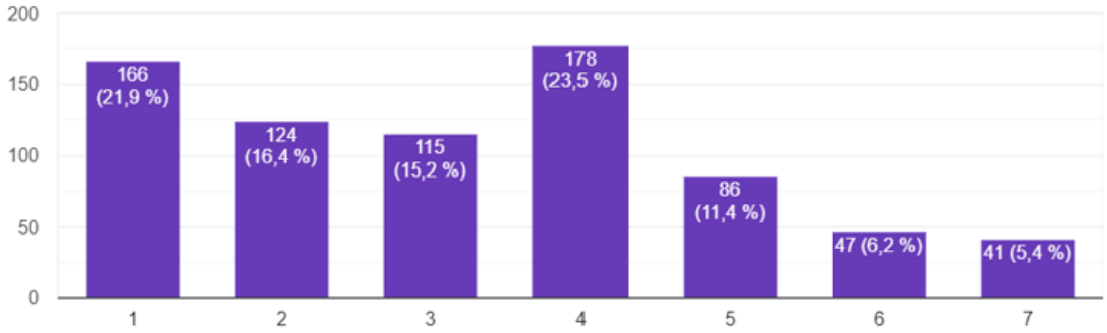


Figure D4.
Subjective norm

SN1. People I know would support me following suggestions on what measures I can take.



SN2. I feel pressure from society to take the measures suggested.



SN3. I feel that there is an expectation that I should take measures to use electricity more efficiently.

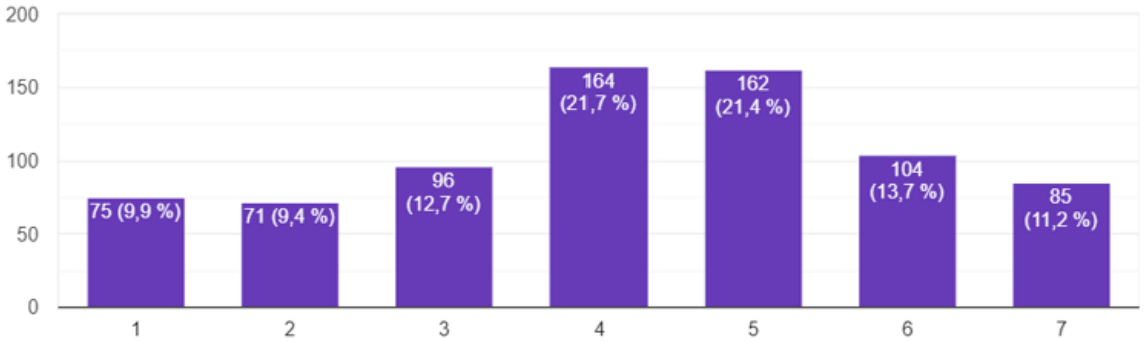
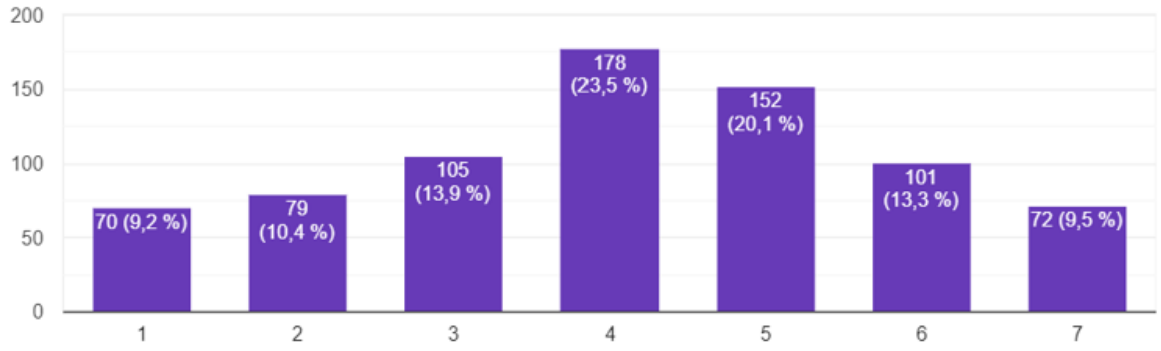
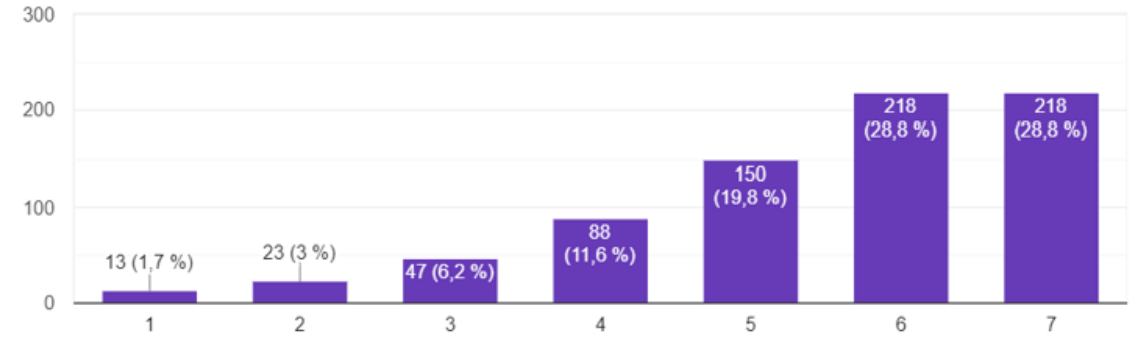


Figure D5.
Perceived behavioural control

PBC1. I have, or can easily obtain, the necessary resources to implement the measures suggested.



PBC2. I have the expertise to understand the information given on what measures I can take.



PBC3. If the information were more tailored to my home, I would be able to do measures suggested.

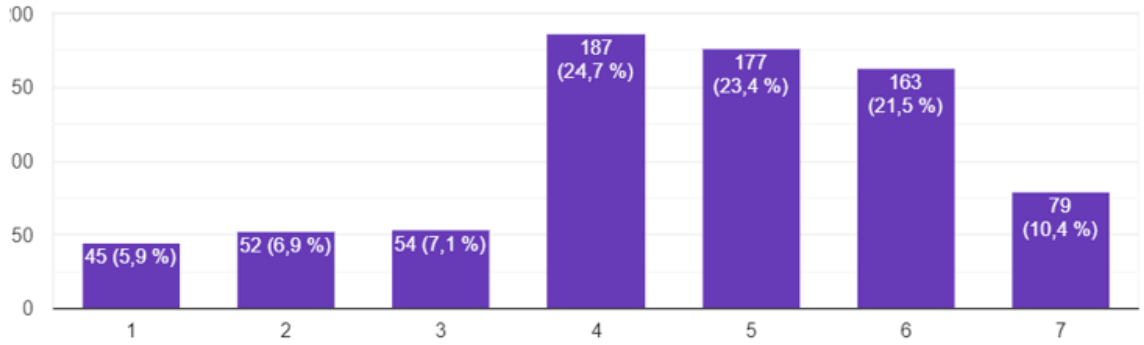


Figure D6.
Behavioural intention of energy-efficiency investments