Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Eidgenössisches Departement für
Umwelt, Verkehr, Energie und Kommunikation UVEK

Bundesamt für Energie BFE

Schlussbericht September 2013

Segmentation and Characterization of Energy Consumers

Consumers' Differences in Energy-Related Behaviors and Commonalities in Perceptions of Others' Behaviors

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Auftraggeber:
Bundesamt für Energie BFE
Forschungsprogramm Energie-Wirtschaft-Gesellschaft
CH-3003 Bern
www.bfe.admin.ch

Auftragnehmer:
ETH Zürich
Consumer Behavior, Institut für Umweltentscheidungen (IED)
Universitätstrasse 22
CH-8092 Zürich
www.cb.ethz.ch

Autoren:
Dr. Bernadette Sütterlin, ETH Zürich, bsuetterlin@ethz.ch
Prof. Dr. Michael Siegrist, ETH Zürich, msiegrist@ethz.ch

BFE-Bereichsleiterin Nicole A. Mathys / **BFE-Programmleiterin** Nicole A. Mathys
BFE-Vertrags- und Projektnummer: 153549 / 102755

Contents

List of Figures

List of Tables

Kurzzusammenfassung

Dem Haushaltsbereich fällt weltweit ein beachtlicher Anteil des Energieverbrauchs zu. Um den Energieverbrauch zu senken, ist es daher auch lohnenswert, Massnahmen auf der Ebene der Haushalte anzusetzen. Für die Entwicklung von massgeschneiderten Massnahmen, die gezielt die individuellen Konsumentenbedürfnisse und -wünsche ansprechen, ist die Identifikation und die differenzierte Beschreibung der Energiekonsumententypen eine Grundvoraussetzung.

Im Rahmen dieses Forschungsprojekts wurden in einem ersten Schritt die Energiekonsumenten nach ihrer sozialen Wertorientierungen differenziert. Aus den Auswertungen ging hervor, dass prosoziale Personen mehr Einschränkungsverhalten im Wohn-, Mobilitäts- und Lebensmittelbereich zeigen als kompetitive und individualistische Personen. Energieeffizienzmassnahmen, die keine Änderung des Nutzungsverhaltens erfordern und einen finanziellen Nutzen bieten, werden hingegen von allen gleichermassen ergriffen. In einer zweiten Studie wurden basierend auf den Sparverhaltensweisen und energiebezogenen psychosozialen Faktoren sechs Energiekonsumententypen identifiziert: idealistische, selbstlose inkonsequente, haushälterische, materialistische, bequemlichkeitsorientierte gleichgültige und problembewusste wohlbefindenorientierte Energiekonsumenten. Alle zeigen unterschiedliche Verhaltensmuster, was das Ausführen der verschiedenen Energiesparmassnahmen anbelangt. Es stellte sich heraus, dass auch Energiekonsumenten mit weniger ausgeprägten Energiesparbemühungen bereit sind, Energiesparmassnahmen zu ergreifen – zumindest diejenigen Massnahmen, die keine Nutzenreduktion mit sich bringen – und dass sie über förderliche energiebezogene Überzeugungen verfügen. Darüber hinaus wurden Energiesparer identifiziert, die beachtliche Sparanstrengungen erbringen, jedoch kein kaufbezogenes Sparverhalten zeigen.

Interventionen haben auch die Aufgabe, Missverständnisse bei der Einschätzung des mit spezifischen Handlungen verbundenen Energieverbrauchs auszuräumen. Diese Missverständnisse entstehen oft durch die Verwendung von Heuristiken und können ein Hindernis für das Ergreifen von wirksamem Energiesparverhalten darstellen. Aus diesem Grund bestand ein zweites Ziel dieser Forschungsarbeit darin, eine von uns neu postulierte Heuristik, genannt die Symbolkraftheuristik, nachzuweisen und die irreführende Wirkung dieser Heuristik zu untersuchen. Die Ergebnisse zeigten, dass Personen sich auf symbolisch aussagekräftige Verhaltensmerkmale (z.B. den Autotyp) stützen und dabei weniger symbolische Verhaltensweisen (z.B. die mit dem Auto zurückgelegte Strecke) vernachlässigen. Es zeigte sich, dass Personen dazu neigen, das Energiebewusstsein von Personen mit einem Verhalten, das symbolisch aussagekräftig für Energiefreundlichkeit ist, zu überschätzen und das Energiebewusstsein von Personen mit einem Verhalten, das symbolisch aussagekräftig für Energieunfreundlichkeit ist, zu unterschätzen. Dieser Effekt erwies sich als ausserordentlich stabil und als auf verschiedene Energieverbrauchsbereiche generalisierbar.

Abstract

The household sector accounts for a substantial portion of energy consumed worldwide. In achieving a reduction in energy consumption, it is thus worthwhile to take measures at household level. In developing tailored interventions that address consumers' individual needs and desires, the identification and differentiated description of energy consumer types is a prerequisite.

In a first step, energy consumers were differentiated according to their social value orientations. Results show that prosocials exhibit more curtailment behaviors in the housing, mobility, and food domains than competitors and individualists. Energy-efficiency measures, however, which require no change in use patterns and provide financial benefit, were equally adopted by the three social value orientation classes. In a second study, based on types of conservation behaviors and energy-related psychosocial factors, six energy consumer types were identified: idealistic, selfless inconsequent, thrifty, materialistic, convenience-oriented indifferent, and problem-aware well-being-oriented energy consumers. They all showed different behavioral patterns regarding adopted energy conservation measures. It was found that even consumer types with less pronounced saving efforts were willing to adopt energy conservation measures – at least the measures that entail no reduction in benefits – and that they dispose of supportive energy-related belief structures. Moreover, energy savers, who show considerable saving efforts but do not engage in purchase-related saving behaviors, were identified.

Interventions also need to clear up consumers' misperceptions about the energy use involved in specific actions, which are often caused by the application of heuristics and may represent barriers to efficient energy conservation behaviors. Therefore, a second aim of this research was to examine a newly postulated heuristic, called the symbolic significance heuristic, and its misleading effects. Findings provide evidence that individuals rely on symbolic significant behavioral attributes (e.g., car type) while neglecting less symbolic behaviors (e.g., covered distance). It was found that individuals were likely to overestimate the energy-consciousness of persons engaged in behaviors that were symbolic significant for energy-friendliness, and to underestimate the energy-consciousness of persons engaged in behaviors that were symbolic significant for energy-unfriendliness. This effect was found to be remarkably stable, and to be generalizable to different energy consumption domains.

Zusammenfassung

Dem Haushaltsbereich fällt weltweit ein beachtlicher Anteil des Energieverbrauchs zu. Im Hinblick auf eine Reduktion des Energieverbrauchs ist es daher auch lohnenswert, Massnahmen auf der Ebene der Haushalte anzusetzen. Um die Konsumenten auf wirksame Weise anzusprechen und sie zu motivieren, ihren Energieverbrauch zu reduzieren, sind massgeschneiderte Kommunikationskampagnen erforderlich. Für die Entwicklung von massgeschneiderten Massnahmen, die gezielt die individuellen Konsumentenbedürfnisse und -wünsche ansprechen, ist wiederum die Identifikation und die differenzierte Beschreibung der Energiekonsumententypen eine Grundvoraussetzung. Dabei ist entscheidend, dass zwischen den unterschiedlichen Energiesparverhaltensweisen differenziert wird, denn die Konsumenten unterscheiden sich in ihrer Bereitschaft die einzelnen Sparverhaltensweisen auszuführen. Genau darin bestand ein erstes Ziel dieses Forschungsprojekts.

Personen unterscheiden sich in ihrer sozialen Wertorientierung (d.h. ob kollektive langfristige oder persönliche kurzfristige Eigeninteressen überwiegen), was sich entsprechend in einer unterschiedlichen Bereitschaft, energiefreundliches Verhalten zu zeigen, widerspiegelt. Es gibt jedoch verschiedene Energiekonsumbereiche und unterschiedliche Arten von Energiesparverhalten und diese stehen in unterschiedlichem Ausmass mit Eigeninteressen in Konflikt. Bisher unterschied die Forschung zur sozialen Wertorientierung und energiefreundlichem Verhalten nicht zwischen den verschiedenen Energiesparverhaltensweisen. Daher war das Ziel der ersten Studie, die Energiesparbemühungen von Personen mit einer unterschiedlichen sozialen Wertorientierung unter Verwendung eines im Hinblick auf die Energieverbrauchsbereiche und Energiesparverhaltensweisen differenzierteren Ansatzes zu untersuchen.

Es wurde eine gross angelegte postalische Befragung bei einer repräsentativen Stichprobe der deutsch- und französischsprachigen Schweiz durchgeführt. In der Studie wurde zwischen Einschränkungsverhalten in verschiedenen Energieverbrauchsbereichen (Wohnen, Mobilität und Lebensmittel) und zwischen unterschiedlichen Arten von Energiesparmassnahmen (Einschränkung und Energieeffizienz) differenziert. Zusätzlich wurden Verhaltensmotive, welche die verschiedenen sozialen Wertorientierungen reflektieren, erhoben. Die soziale Wertorientierung der Teilnehmer wurde mittels der „decomposed game“-Technik bestimmt.

Die Ergebnisse zeigen, dass prosoziale Personen mehr Einschränkungsverhalten im Wohn-, Mobilitäts- und Lebensmittelbereich zeigen als kompetitive und individualistische Personen. Energieeffizienzmassnahmen, die keine Änderung von Verbrauchsmustern erfordern und finanzielle Vorteile bieten, wurden hingegen von Personen aller drei Wertorientierungsklassen gleichermassen ergriffen. Ihren Bemühungen lagen jedoch unterschiedliche Motive zugrunde; kompetitive und individualistische Personen waren stärker an den finanziellen Vorteilen der Energieeinsparung interessiert als prosoziale, während das Energiesparverhalten Letzterer stärker durch Energiebewusstsein angetrieben wurde.

Für eine akkurate Identifikation und detaillierte Beschreibung der unterschiedlichen Verhaltensmöglichkeiten der Energiekonsumententypen und der entsprechend Ansatzpunkte für Interventionen ist es zwingend erforderlich, zwischen den verschiedenen Energiesparverhaltensweisen zu differenzieren. Die wenigen bisherigen Studien, die Verhaltensvariablen als Segmentierungsbasis verwendet haben, machten jedoch entweder gar keinen Unterschied zwischen den verschiedenen Energiesparverhaltensweisen oder taten dies auf wenig differenzierte oder unvollständige Weise. Das Ziel der zweiten Studien war entsprechend, unter Verwendung eines im Hinblick auf die verschiedenen Energiesparverhaltensweisen differenzierteren und in Bezug auf die berücksichtigten energiebezogenen psychosozialen Faktoren umfassenderen Ansatzes unterschiedliche Energiekonsumententypen zu identifizieren und zu beschreiben.

In der Studie wurden unterschiedliche Energiesparverhaltensweisen erfasst. Dabei wurde zwischen direktem und indirektem energiefreundlichem Verhalten und zwischen Sparverhaltensweisen basierend auf Einschränkungen, Umstellungen des Konsums (z.B. Kauf von regionalen Produkten) und Energieeffizienzmassnahmen unterschieden. Zudem wurde zwischen den Energieverbrauchsbereichen unterschieden (Wohnen, Mobilität und Lebensmittel). Nebst den separat betrachteten Sparverhaltensweisen stellten auch verschiedene psychosoziale Variablen (Überzeugungen, Einstellungen und Motivation) die Segmentierungsbasis dar und gingen in die Clusteranalyse ein. Die Daten wurden im Rahmen einer gross angelegten postalischen Befragung erhoben. Der Fragebogen wurde an eine Zufallsauswahl von Haushalten in der deutsch- und französischsprachigen Schweiz geschickt.

Sechs Energiekonsumentensegmente wurden identifiziert: die idealistischen, die selbstlosen inkonsequenten, die haushälterischen, die materialistischen, die bequemlichkeitsorientierten gleichgültigen und die problembewussten wohlbefindenorientierten Energiekonsumenten. Alle Segmente zeigten im Hinblick auf die ausgeführten Energiesparverhaltensweisen ein unterschiedliches Verhaltensmuster und hatten unterschiedliche Einstellungen, Überzeugungen und Motivationen.

Zusammenfassend zeigen die zwei Studien zur Identifikation und Beschreibung von Energiekonsumententypen auf, dass grundsätzlich auch Energiekonsumenten mit weniger ausgeprägten Energiesparbemühungen gewillt sind, Energiesparmassnahmen zu ergreifen – zumindest diejenigen Massnahmen, die für sie keine Nachteile bringen – und dass sie durchaus über vielversprechende Überzeugungsstrukturen verfügen. Darüberhinaus wurden Energiekonsumenten identifiziert, die grundsätzlich beachtliche Energiesparbemühungen zeigen, aber nicht gewillt sind, energiefreundliches kaufbezogenes Verhalten zu zeigen. Basierend auf den Ergebnissen lassen sich folgende Handlungsempfehlungen ableiten:

- **Betonung der Vereinbarkeit von Energiesparen und Eigeninteresse**: Eigennützigen Energiekonsumententypen sind Komfort, Lebensqualität und Geld wichtig; Energiesparen ist aus ihrer Sicht mit diesen Interessen unvereinbar. Wie unsere Studien zeigen, sind eigennützige Energiekonsumententypen aus finanziellen Überlegungen heraus jedoch durchaus bereit, Energieeffizienzmassnahmen zu ergreifen. Diese Anstrengungen sollten weiter gefördert. Dazu könnten beispielsweise Kommunikationskampagnen beitragen, in denen eine Übersicht über Energiesparmassnahmen, die keinerlei Einschränkungen bezüglich Komfort oder Lebensqualität erfordern, gegeben wird und explizit die Vereinbarkeit von Energiesparen und (bisherigem) Lebensstil hervorgehoben wird. Zudem sollten auch die finanziellen Vorteile betont werden.

- **Stärken von Wirksamkeitsüberzeugungen durch Bereitstellung von Wissen und Information**: Damit eine Person motiviert ist, ein bestimmtes Sparverhalten zu zeigen, ist es zentral, dass sie der festen Überzeugung ist, dass diese Handlung auch wirksam ist, um den gewünschten Effekt zu erzielen. Dem problembewussten wohlbefindenorientierten Energiekonsumenten fehlt genau diese Überzeugung der Wirksamkeit des eigenen Handelns (Selbstwirksamkeit). Dadurch wird er entsprechend auch ein Sparverhalten, das eigentlich mit seinem Komfortwünschen vereinbar wäre, nicht zeigen, da er sich dieser Art von Sparverhalten nicht bewusst ist oder zu wenig darüber weiss, um es auszuführen. Die Vermittlung von Informationen, in denen Handlungsmöglichkeiten aufgezeigt und konkrete Instruktionen gegeben werden, könnten die Bereitschaft zu energiefreundlichem Verhalten erhöhen. Die Wissensvermittlung könnte dabei bereits in der Schule angesetzt werden.

- **Festigen von Wirksamkeitsüberzeugungen durch Stärkung des Vertrauens**: Was kaufbezogenes Energiesparverhalten anbelangt, so ist es wesentlich, dass die Konsumenten den Informationen zur Energiefreundlichkeit der Produkte vertrauen. Wenn Konsumenten skeptisch sind, was den Wahrheitsgehalt von Aussagen zur Umwelt-

freundlichkeit anbelangt, könnten kaufbezogene Sparmassnahmen generell als unwirksam eingestuft werden. Dies ist möglicherweise beim selbstlosen inkonsequenten Energiekonsumenten der Fall, da kaufbezogene Handlungen die einzige Art von Energiesparverhalten sind, die bei ihm vergleichsweise wenig ausgeprägt sind. Um das Vertrauen in die Glaubwürdigkeit von Produktelabels (wieder)herzustellen, ist es wichtig, dass Produktlabels nur von einer einzigen unabhängigen Einrichtung vergeben und kontrolliert werden und dass Übertreibungen von Produktversprechungen (Werbeaussagen) vermieden werden. Zudem sollten generell Informationen zu Wirksamkeit von kaufbezogenem Sparverhalten von vertrauenswürdigen Experten vermittelt werden.

- **Schaffen von sozialen Normen**: Menschen sind bemüht, den sozialen Normen zu entsprechen. Bei den identifizierten Energiekonsumentensegmenten gab es insbesondere zwei Konsumententypen, die einen beachtlichen sozialen Druck verspürten, sich energiefreundlich zu verhalten; der haushälterische und der problembewusste wohlbefindenorientierte Energiekonsument. Diese zwei Energiekonsumententypen könnten daher speziell für Interventionsmassnahmen empfänglich sein, die den Akzent auf soziale Normen setzen. Nebst dem Schaffen von sozialen Normen mittels Medienkampagnen könnten die Konsumenten auch dazu motiviert werden, sich öffentlich zu verpflichten, Energie zu sparen. Dadurch werden soziale Erwartungen kreiert, denen die Konsumenten gerecht werden wollen und entsprechend intensivieren sie ihre Sparbemühungen. Ein anderer Ansatz, der sowohl auf dem durch die Konsumenten wahrgenommenen sozialen Druck als auch auf der kompetitiven Denkweise basiert, besteht darin, den Konsumenten ein vergleichendes Feedback zum Energieverbrauch zu geben, das die Leistung (bzw. den Verbrauch) eines Energiekonsumenten relativ zu derjenigen von anderen angibt.

- **Verbinden von energiefreundlichem Verhalten mit sozialem Status**: Der Wunsch einer Person, durch gesellschaftliche Anerkennung ihrer Anstrengungen ein gewisses Ansehen oder einen gewissen Status zu erzielen, könnte ein Antrieb zu energiefreundlichem Verhalten sein. Da gewisse Verhaltensweisen eine starke Signalwirkung bezüglich Energiefreundlichkeit haben, sollte die starke symbolische Bedeutung von diesen Verhaltensweisen, zum Beispiel durch die Werbung, weiter betont werden. Zusätzlich könnte hervorgehoben werden, dass im Zusammenhang mit der Ausführung einer energiefreundlichen Handlung einer Person ein bestimmter Status zugeschrieben wird. Dadurch würde grünes (Kauf-)Verhalten schliesslich mit Status verbunden.

- **Verbinden von energiefreundlichem Verhalten mit Fortschrittlichkeit**: Um die Bedürfnisse von Konsumentensegmenten anzusprechen, die allgemein wenig Energiesparbemühungen zeigen, gerne luxuriös leben und nach Prestige streben, könnten Werbekampagnen derart designt werden, dass Fahrer von energiefreundlichen Autos als zukunftsorientiert, modern und interessierte an technologischen Innovationen wahrgenommen werden.

Interventionen haben auch zur Aufgabe, Missverständnisse bei der Einschätzung des mit spezifischen Handlungen verbundenen Energieverbrauchs auszuräumen. Diese Missverständnisse entstehen oft durch die Verwendung von Heuristiken und können ein Hindernis für das Ergreifen von wirksamem Energiesparverhalten darstellen, da Konsumenten beispielsweise das Energiesparpotential von verschiedenen Energiesparverhaltensweisen nicht adäquat einschätzen können. Aus diesem Grund bestand ein zweites Ziel dieses Forschungsprojekts im Nachweis einer von uns neu postulierten Heuristik, genannt die *Symbolkraftheuristik*, und der Untersuchung der irreführenden Wirkung dieser Heuristik.

Die postulierte Symbolkraftheuristik trägt der Wichtigkeit, die der symbolischen Bedeutung eines Verhaltens zukommt, Rechnung. Es ist anzunehmen, dass diese Heuristik vor allem in der Entscheidungsfindung im Zusammenhang mit besonders gesellschaftlich geprägten Themen, wie Energiefreundlichkeit, zur Anwendung kommt. Die Heuristik basiert auf der

Annahme, dass Menschen ihre Urteile eher auf symbolisch aussagekräftige Verhaltensweisen (z.B. der gefahrene Autotyp) abstützen und dabei andere neutrale oder weniger symbolisch aussagekräftige Informationen (z.B. die mit dem Auto zurückgelegte Distanz) weitgehend ignorieren. Dies kann entsprechend zu verzerrten Beurteilungen führen (z.B. Über- / Unterschätzung des Energieverbrauchs).

Fünf Experimente in Form von Onlinestudien wurden durchgeführt. Die Stichproben bestanden aus Mitgliedern des Internet-Panels der Consumer Behavior Gruppe der ETH Zürich (Experiment 1 und 3), aus Empfängern einer Mailingliste (Experiment 2) und aus Mitgliedern des Internet-Panels des Schweizer Marktforschungsinstituts LINK (Experiment 4 und 5). In den Experimenten wurden den Teilnehmern zwei Energiekonsumentenbeschreibungen vorgelegt. Beide Beschreibungen beinhalteten ein symbolisch aussagekräftiges und ein symbolisch neutrales Verhalten. Die qualitative Ausprägung des symbolisch aussagekräftigen und des symbolisch neutralen Verhaltens wurden dabei jeweils systematisch variiert; ein Konsument zeigte ein positives symbolisch aussagekräftiges Verhalten (z.B. das Fahren eines Toyota Prius) und ein negatives symbolisch neutrales Verhalten (z.B. das Zurücklegen von 28'700 km mit dem Auto) und der andere Konsument zeigte ein negatives symbolisch aussagekräftiges Verhalten (z.B. das Fahren eines SUV) und ein positives symbolisch neutrales Verhalten (z.B. das Zurücklegen von 11'400 km mit dem Auto). Der Fokus der Verhaltensbeurteilung wechselte in den Experimenten von der Beurteilung des allgemeinen Energiebewusstseins zu der spezifischen Beurteilung des Energiebewusstseins bezogen auf das beschriebene Verhalten bis hin zu der direkten Beurteilung des Energieverbrauchs. Um die Robustheit des „Symbolkraft-Trugschlusses“ zu testen, wurden die Entscheidungssituationen zudem so designt, dass eine 100% adäquate Beurteilung (d.h. Berechnung) möglich war. Weiter wurden verschiedene Alternativerklärungen für den gefundenen Effekt ausgeschaltet.

Die Ergebnisse bekräftigen die Annahme, dass Personen die Symbolkraftheuristik anwenden; das Energiebewusstsein von Personen mit Verhaltensweisen, die symbolisch aussagekräftig für Energiefreundlichkeit sind, wurde überschätzt und ihr Energieverbrauch wurde unterschätzt, während das Energiebewusstsein von Personen mit Verhaltensweisen, die symbolisch aussagekräftig für Energieunfreundlichkeit sind, unterschätzt und der Energieverbrauch überschätzt wurde. Die Resultate deuten darauf hin, dass der „Symbolkraft-Trugschluss“ auf verschiedene Energieverbrauchsbereiche generalisierbar und erstaunlich robust ist.

Das Abstützen von Urteilen auf symbolisch aussagekräftiges Verhalten hat folgende Implikationen für die Entwicklung von Interventionsmassnahmen:

- **Sensibilisierung für eine holistische(re) Betrachtung der einzelnen den Energieverbrauch bestimmenden Verhaltensweisen**: Aufgrund des einseitigen Fokus auf symbolisch aussagekräftige Konsumverhaltensweisen könnten negative weniger symbolisch aussagekräftige Verhaltensweisen intensiviert werden. Entsprechend könnten Einsparungen, die durch das Ergreifen von symbolisch aussagekräftigem Verhalten herbeigeführt werden, neutralisiert oder der Energieverbrauch insgesamt sogar erhöht werden. Darüber hinaus besteht die Möglichkeit, dass das Ergreifen von symbolisch aussagekräftigen Verhaltensweisen als Legitimation dient, die Sparbemühungen in Bezug auf andere energiefreundliche Verhaltensweisen zu reduzieren. Aus diesen Gründen ist es wichtig, die Aufmerksamkeit in Kommunikationskampagnen vermehrt auch auf weniger symbolisch aussagekräftige Konsum- und Sparverhaltensweisen zu lenken. Es ist wichtig, die Konsumenten dazu zu ermutigen, einen allgemeineren und umfassenderen Blick auf den Energieverbrauch zu werfen, damit sie in ihren Entscheidungen jedes einzelne Verhalten, das zum Gesamtenergieverbrauch beiträgt, berücksichtigen.

Executive Summary

The household sector accounts for a substantial portion of energy consumed worldwide. In achieving a reduction in energy consumption, it is thus worthwhile to take measures at household level. To effectively address and motivate consumers to reduce energy consumption, tailored intervention and communication campaigns are essential. In developing tailored interventions that address consumers' individual needs and desires, the identification and differentiated description of energy consumer types is a prerequisite. Thereby, it is crucial that various types of energy conservation behaviors be differentiated from one another, as consumers differ in their willingness to adopt individual conservation behaviors. Doing so was a first aim of this research project.

People differ in their social value orientations (i.e., whether collective long-term interests or personal short-term self-interests prevail), which is reflected in a different willingness to perform energy-friendly behaviors. However, there exist different domains and types of energy-conservation behaviors, and these behaviors are to differing degrees in conflict with self-interests. To this point, research on social value orientation and energy-friendly behavior has made no distinction between the various energy-consumption behaviors. Therefore, investigating the energy-conservation efforts of people with different social value orientations by applying a more differentiated approach with regard to energy-consumption domains and types of energy-conversation measures was the subject of the first study.

A large-scale mail survey was conducted including a representative sample of the German- and French-speaking parts of Switzerland. The study distinguished between curtailment behaviors of different energy-consumption domains (housing, mobility, and food) and between different types of energy-conservation measures (curtailment and energy efficiency). Furthermore, behavioral motives reflecting the different social value orientations were assessed. Participants' social value orientation was assessed by means of the "decomposed game" technique.

Results show that prosocials exhibit more curtailment behaviors in the housing, mobility, and food domains than competitors and individualists. Energy-efficiency measures, however, which require no change in use patterns and provide financial benefit, were equally adopted by the three social value orientation classes, though their efforts were driven by different motives; competitors and individualists were more interested in the financial benefits gained from conservation than prosocials, while the latter were more driven by energy consciousness.

For a precise identification and detailed description of the different behavioral opportunities of energy consumer types and corresponding starting points for interventions, it is essential to differentiate between the various conservation behavior types. The few studies that have used behavioral variables as a segmentation base either have not differentiated between the various types of conservation behaviors or have done so only in a less distinctive or incomplete way. Consequently, the aim of the second study was to identify and describe the different energy consumer types using a much more differentiated approach with respect to the distinction of different energy-conservation behaviors and a more comprehensive approach with regard to considered energy-related psychosocial factors.

The study assessed different energy-conservation behaviors. It distinguished between direct and indirect energy-friendly behavior and between conservation actions based on curtailment, shifts in consumption (e.g., purchasing regional foods), and energy efficiency. Furthermore, the study differentiated between energy-consumption domains (housing, mobility, and food). Besides the separately considered conservation behavior types, various psychosocial variables (beliefs, attitudinal and motivational variables) formed the segmentation base

and were subjected to cluster analysis. Data were derived from a large-scale mail survey that was sent to a random sample of households in the German- and French-speaking parts of Switzerland.

Six energy consumer segments were identified: the idealistic, the selfless inconsequent, the thrifty, the materialistic, the convenience-oriented indifferent, and the problem-aware well-being-oriented energy consumer. All segments show different behavioral patterns with regard to types of energy-conservation actions performed and hold different attitudes, beliefs, and motivations.

Summing up, the two studies on the identification and description of energy consumer types provide evidence that even consumer types with less pronounced saving efforts are willing to adopt energy conservation measures – at least the measures that entail no reduction in benefits – and that they dispose of supportive energy-related belief structures. Moreover, energy savers, who show considerable saving efforts but do not engage in purchase-related saving behaviors, were identified. The following policy recommendations can be derived from these findings:

- **Emphasis on the compatibility of energy conservation and self-interest**: Self-interested energy consumer types care about comfort, quality of life, and financial issues; energy conservation behavior is perceived to conflict with these interests. However, as our study results indicate, self-interested energy consumer types are quite willing to adopt energy-efficiency measures due to financial reasons. These efforts might be further increased by, for example, running communication campaigns that provide an overview of conservation measures requiring no restriction in comfort or quality of life. The campaigns could especially point to the compatibility of energy conservation and (current) lifestyle and stress the financial benefits.

- **Strengthening of efficacy beliefs through provision of knowledge and information**: The belief that an action is effective in attaining a desired effect is central for the motivation to engage in a specific behavior. The problem-aware well-being-oriented energy consumer lacks perceived self-efficacy. This constitutes a barrier to engage in behaviors that would be compatible with his desire for comfort, but which he is simply not aware of or about which he does not have enough knowledge to put them into action. Transmission of information through media that points out opportunities for action and gives clearly comprehensible and concrete instructions could increase the willingness to engage in these conservation efforts. This provision of knowledge and information could already be initiated on the level of school education.

- **Strengthening of efficacy beliefs through increasing trust**: Regarding purchase-related energy conservation behavior, it is essential that consumers trust in the information provided concerning products' energy friendliness. If consumers are skeptical about the truth of an environmental claim, the purchase-related conservation measures might be considered ineffective. This could be the case with the selfless inconsequent energy saver because purchase-related conservation efforts are the only behavior types that are comparably poorly pronounced. To (re)create trust in the credibility of product labels it is essential that product labels are awarded and controlled by one single and independent body and that exaggerations of product claims are avoided. Furthermore, information on the efficacy of purchase-related measures should be provided by trusted experts.

- **Establishment of social norms**: Individuals strive to conform to social norms. There are two energy consumer types that perceive considerable social pressure to show energy-friendly behavior: the thrifty energy saver and the problem-aware well-being oriented energy consumer. These two consumer types might prove especially susceptible to inter-

ventions focusing on social norms. Besides establishing social norms through media campaigns, consumers could be motivated to make a public commitment to conserve energy. Thereby, social expectations are created which consumers aim to meet and they consequently increase conservation efforts. Another approach that relies on consumers perceived social pressure and also on their competitive thinking is to provide consumers with comparative feedback indicating consumers' performance relative to others.

- **Relating energy-friendly behavior to social status**: People's desire to hold a certain reputation or status through social approval of their efforts could be a driver for energy-friendly behavior. As certain behaviors serve as a signal for energy friendliness, the strong symbolic meaning of such behaviors could be further emphasized through, for example, advertisement. Additionally, the ascription of a desired status related to engagement in this behavior could be highlighted and, thus, green (purchase) behavior could be linked to status.

- **Relating energy-friendly behavior to progressiveness**: To better address the needs of poor performers who savor luxury and strive for prestige, advertisement campaigns could be designed in a way that, for example, drivers of energy-friendly cars are perceived as future-oriented, modern and interested in technological innovation.

Interventions also need to clear up consumers' misperceptions about the energy use involved in specific actions, which are often caused by the application of heuristics and may represent barriers to the adoption of effective energy-conservation behaviors, as consumers, for example, do not adequately estimate the energy-saving potentials of various conservation behaviors. Therefore, a second aim of this research project was to examine a newly postulated heuristic, called the *symbolic significance heuristic*, and its misleading effects.

The *symbolic significance heuristic* is assumed to come into play in decision situations on subjects that are especially socially shaped, such as energy friendliness, and stresses the decisiveness of behaviors' symbolic meaning. The heuristic postulates that people rely on symbolic significant behavioral attributes (e.g., car type) while largely ignoring other neutral or less symbolic significant information (e.g., distance covered by car), which might subsequently result in biased judgments (e.g., over- / underestimation of energy consumption).

Five experimental studies in the form of online studies were conducted. The samples consisted of members of the Internet Panel of the Consumer Behavior Group, ETH Zurich, (Experiment 1 and 3), recipients of a mailing list (Experiment 2), and members of the Internet Panel of the Swiss market research institution LINK (Experiment 4 and 5). In the experiments, participants were presented with two energy consumer descriptions each including a symbolic significant and a symbolic neutral behavior. Thereby, the value of the symbolic significant and the symbolic neutral behavior were systematically varied; one consumer engaged in a positive symbolic significant behavior (e.g., driving a Toyota Prius) and a negative symbolic neutral behavior (e.g., covering 28,700 km) and the other consumer engaged in a negative symbolic significant behavior (e.g., driving an SUV) and a positive symbolic neutral behavior (e.g., covering 11,400 km). In the experiments, the focus shifted from judging general energy consciousness to specifically judging energy consciousness related to the described behavior and further to directly judging energy consumption. Moreover, to test for the stability of the symbolic significance fallacy, decision situations were designed in a way that allowed for a 100% adequate judgment (i.e., calculation). Furthermore, several alternative explanations for the effect were ruled out.

Findings support the notion of people's use of the *symbolic significance heuristic*, showing that the energy consciousness of persons with behaviors that are symbolic significant for energy friendliness is overestimated and energy consumption is underestimated, while the energy consciousness of persons with behaviors that are symbolic significant for energy un-

friendliness is underestimated and energy consumption is overestimated. The symbolic significance fallacy was demonstrated to be generalizable to different energy-consumption domains and proved to be of remarkable robustness.

The reliance on symbolic significant behavioral attributes has the following implications with regard to the development of policy and intervention measures:

- **Sensitizing consumers to take a more comprehensive look at behaviors determining energy consumption**: Due to the one-sided focus on symbolic significant consumption behaviors, negative less symbolic significant behaviors could be intensified. Thus, the gains from the positive symbolic significant energy conservation behavior could be neutralized or overall energy consumption could even be increased. Moreover, people could perceive engagement in symbolic significant conservation behaviors as legitimization to reduce their efforts with regard to other energy-friendly behaviors. Therefore, it is important to devote more attention to less symbolic consumption and conservation behaviors in communication campaigns. It is crucial to encourage consumers to take a more general and comprehensive look at energy consumption, so that they consider each single behavior that contributes to overall energy consumption.

General Introduction

1. Introduction

In 1979, in a remarkable visionary move, former President of the United States of America, Jimmy Carter, erected solar panels on the roof of the White House. Facing the energy crisis – a situation of increasing energy use and dependence on foreign oil, where people suddenly became aware of the finite supply of the energy sources used up to this point of time – President Carter called for a nationwide campaign to conserve energy and stressed the need to shift to renewable energy sources. The solar panel installation on the White House was aimed to provide a symbol for the aspired energy transition. At the dedication ceremony on June 20, 1979, President Carter confidently predicted, "In the year 2000, this solar water heater behind me, which is being dedicated today, will still be here supplying cheap, efficient energy" (Hemauer & Keller, 2010). Envisioning the possible future scenarios, President Carter added, "A generation from now, this solar heater can either be a curiosity, a museum piece, an example of a road not taken, or it can be just a small part of one of the greatest and most exciting adventures ever undertaken by the American people" (Hemauer & Keller, 2010). Time showed that his prediction that the solar panels would still be on the roof of the White House in the year 2000 did not hold true. In fact, only a few years later, in 1986, as the energy crisis had subsided, the Reagan administration removed the installation. Thus, Carter's visionary move *was* representative of a road not taken, a reminder of missed opportunities. The story of President Carter's solar panels was picked up in the documentary *A Road Not Taken* by Swiss artists Christina Hemauer and Roman Keller (2010) in which they travel back to the time of the oil crisis.

President Jimmy Carter's energy policies, which focused on renewable energy and efficiency, were several decades "ahead of the times". The concerns about future energy supply and climate change in that era reflect the problems we are much more directly facing today. The future that they were worried about back then is today. Possible strategies to ensure future energy supply and measures to achieve a reduction in energy consumption to overcome an imminent supply gap are major discussion topics today. March 11, 2011, the day of the nuclear accident at Fukushima Daiichi that is now deeply engraved in people's collective memory and that (re)initiated the discussion on the acceptance of nuclear power plants (Visschers & Siegrist, 2013), added even more weight to the present subject of energy consumption reduction. The incident had a direct influence on the energy policies of various countries as they began to reconsider their strategies on how to ensure future energy supply while protecting the climate and reducing reliance on fossil fuels. Thus, for example, the Swiss Federal Council decided to phase out nuclear energy (Bundesrat, 2011b) since nuclear energy, formerly considered a valid option to mitigate climate change due to its low carbon dioxide emissions (Dones, Heck, & Hirschberg, 2004), seemed to no longer represent a suitable alternative to add to the prevention of an energy supply gap. Since that time, however, the subject of the imminent energy supply gap has become increasingly urgent. To achieve sustainable and climate-friendly coverage for the increasing energy demand, two strategic approaches are key: firstly, the reduction of energy consumption through more efficient use of energy and through voluntary curtailment behavior (i.e., sufficiency); and secondly, the increased reliance on renewable energy (Akademien der Wissenschaften Schweiz, 2012).

Nationally, the residential sector accounts for 16-50% of the energy consumption of all sectors, and averages approximately 30% worldwide (Saidur, Masjuki, & Jamaluddin, 2007; Swan & Ugursal, 2009). Consequently, at the household level, there is considerable energy-saving potential that needs to be tapped in order to make an effective contribution to the reduction of energy consumption and mitigate climate change. To successfully motivate energy consumers (i.e., households) to change their energy-consumption patterns, efficient communication and marketing campaigns are essential. However, *the* energy consumer as such does not exist. Rather, consumers differ in their energy consumption and conservation be-

haviors. Energy-friendly behavior can be expressed in various ways, since energy consumption is related to different behavioral domains in everyday life (cf. BAFU, 2006) and there are different types of conservation measures that energy consumers can adopt (Stern, 2000). Furthermore, numerous factors have been found to influence energy-conservation efforts and energy consumption (for an overview, see Lutzenhiser, 1993; Steg & Vlek, 2009; Stern, 2000; Wilson & Dowlatabadi, 2007). Considering that consumers differ in their degree of engagement in the various types of energy-saving behaviors, and given that consumers differ in the characteristics of the factors that drive consumption behavior, it becomes clear that different types of energy consumers exist. To achieve a maximum effect from intervention strategies, tailored communication and marketing campaigns that specifically address the desires and needs of the individual energy consumer types are required. However, in order to reach at this point, it is essential to identify and describe the different types of energy consumers and thus uncover promising starting points and possible energy savings. This was a first aim of the present research project.

Energy consumers do not only differ in their energy-related behaviors and the characteristics of the factors that influence energy-consumption behavior, but they also share features that may play a role in decisions related to energy consumption. Energy consumers (i.e., people in general) share, for example, the propensity to make judgments and decisions without fully considering or comprehending all information that is available to them, because they may, for example, rely on certain judgmental heuristics. The application of these heuristics may result in misperceptions or biases (Kahneman, 2003; Tversky & Kahneman, 1974). Furthermore, due to social interactions, a common sense about the symbolic meaning of objects and behaviors among consumers exists (Blumer, 1969; for an overview, see Charon, 2007). Consumer goods and behaviors always carry meaning and, therefore, a person indirectly makes a statement about his/her values and convictions through his/her consumption behavior (for an overview, see Jackson, 2005). This is also true for energy-related behaviors (Sadalla & Krull, 1995; Skippon & Garwood, 2011). The symbolic meanings of energy-related behaviors might readily serve as a heuristic attribute bearing the risk of leading to misperceptions that may result in maladaptive energy-conservation or -consumption behaviors. Therefore, a second aim of this research project was to investigate the impact of behaviors of high symbolic value on people's judgments about energy consciousness.

2. Security of the Energy Supply

The world's energy consumption is steadily increasing due to population growth, urbanization, and modernization, while fossil fuels are being depleted (Asif & Muneer, 2007). Looking into the future, under the assumption that recent government commitments are implemented, it is estimated that global energy demand will further increase by one-third from 2010 to 2035. This increase is anticipated to be largely attributable to non-OECD (Organisation for Economic Co-operation and Development) economies that cause 90% of the growth (IEA, 2011). As the world is facing severe challenges related to increased energy consumption, specifically, ensuring the security of energy supplies and averting global warming, the need to reduce energy consumption and to increase the share of renewable technologies becomes evident.

Energy consumption in Switzerland has also increased substantially over the past decades. In 2010, final energy consumption reached 911,550 terajoules, a new record level (see Figure 1.1), and represented a 4.4% increase in final energy consumption as compared to the previous year (BFE, 2011b). In general, electricity gains more and more importance in the energy supply. The rise in electricity consumption is due to increases in the number of electrical appliances, the higher electricity demand of railway and telecommunications companies, and the trend toward substituting fossil fuels with electricity (Akademien der Wissenschaften Schweiz, 2012). In the last decades, electricity consumption has dramatical-

ly increased. While electricity consumption in the year 1970 was 25 terawatt hours (TWh), the consumption in the year 2010 was more than twice as much, 60 TWh. This corresponds to an average annual growth rate of 2%. Given the increasing energy demand and depleting energy sources, reinforced by the decision of the Swiss Federal Council to phase out nuclear energy, the energy turnaround is prerequisite to ensuring the future energy supply (cf. Figure 1.2).

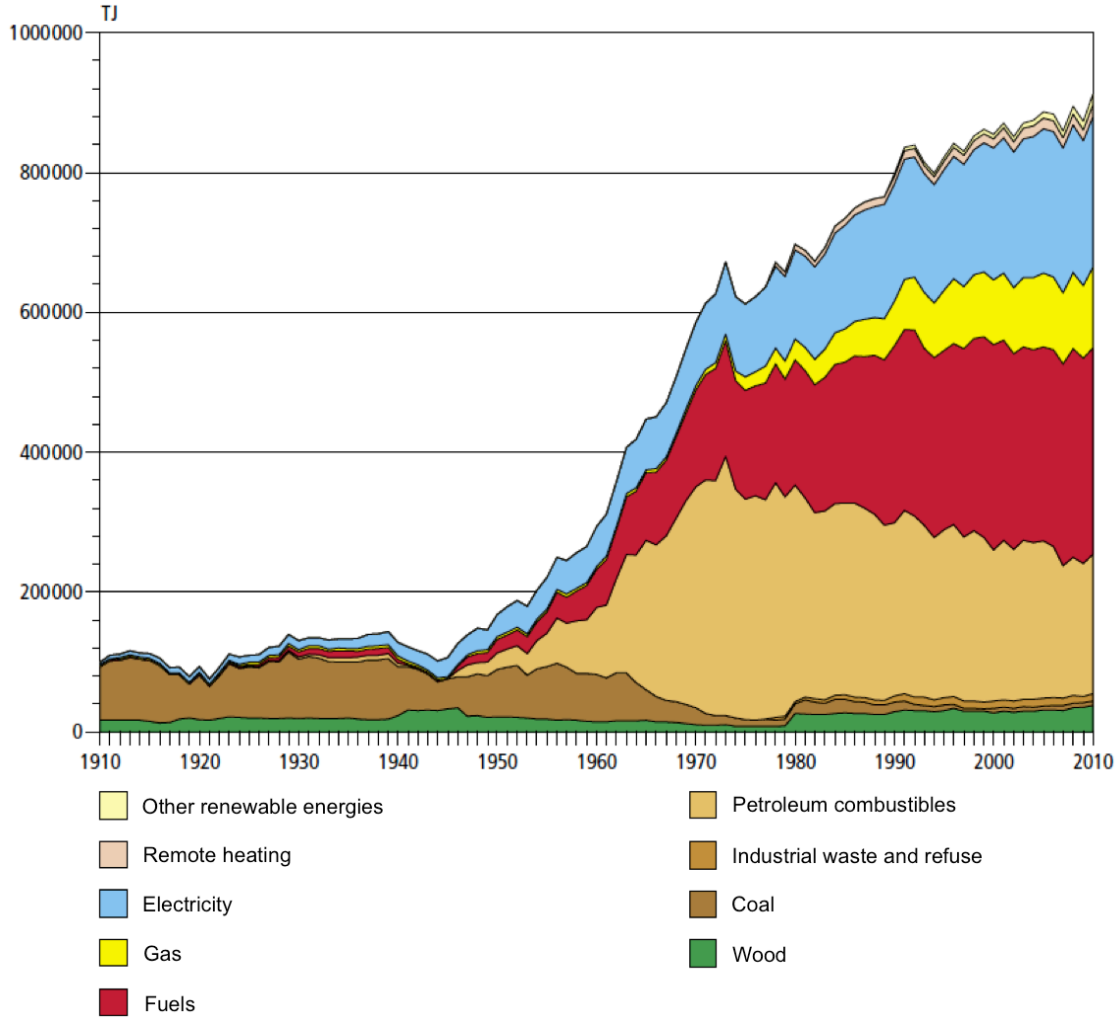


Figure 1.1. **Final energy consumption in Switzerland 1910-2010, by energy carrier (Source: BFE, 2011b).**

The transformation of the energy system in Switzerland has been considered feasible from a technological point of view and is considered economically viable (Andersson, Boulouchos, & Bretschger, 2011). However, a factor that is hard to forecast, but which is crucial for the success of the strategy embarked on, is energy consumers' acceptance of the required behavioral measures in terms of adoption of energy-efficient technologies and changes in lifestyle in general. In Switzerland, households are responsible for 31.2% of the total energy requirements (BFE, 2011a). This represents a substantial part of total energy consumption and the household sector, in general, has considerable opportunity for energy savings. To achieve the desired reduction in energy consumption, behavioral changes are also necessary since efficiency gains through technical measures are depleted by consumption growth (Hertwich, 2005). This raises the questions of whether, and to what extent, consumers or households accept changes and shifts in their consumption patterns and whether they accept and implement technical innovations. Confronted with these questions and with a view toward possible strategies to motivate consumers to engage in these efforts, the importance and contri-

bution of research in the field of social sciences is acknowledged and emphasized (CORE, 2011).

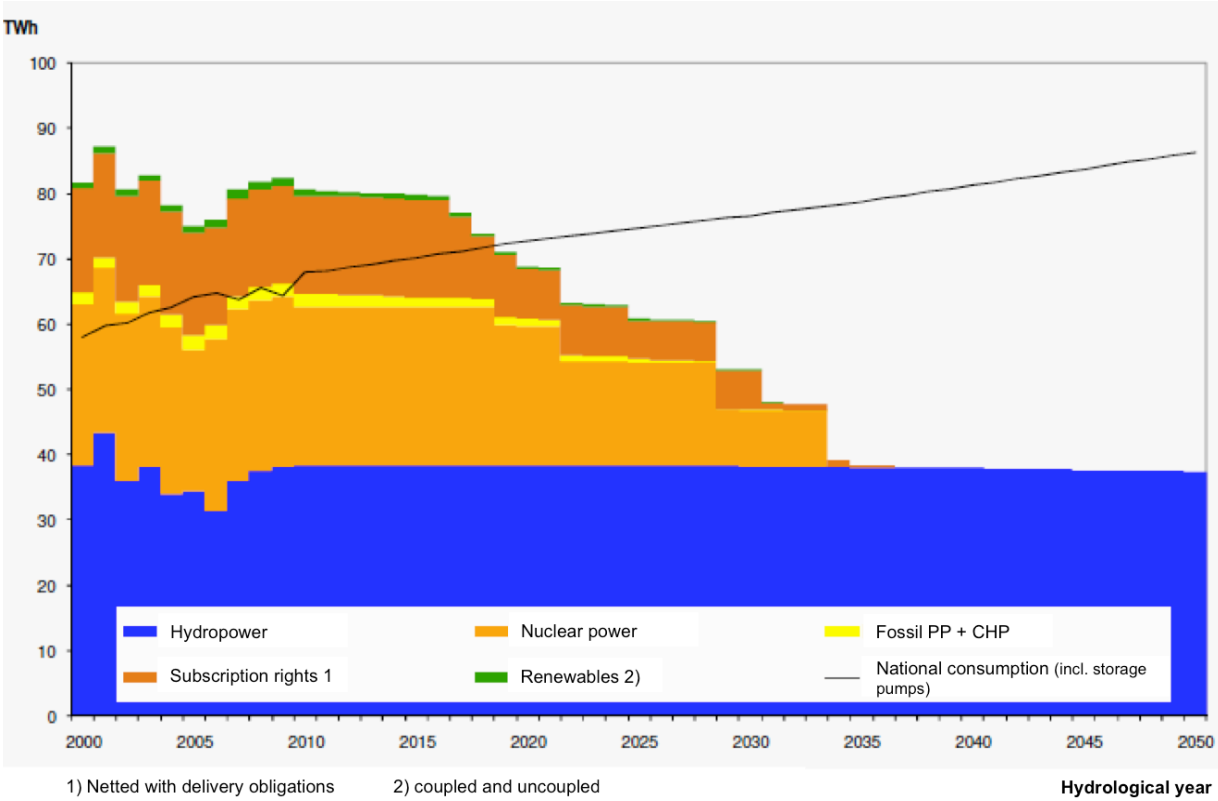


Figure 1.2. **Development of the hypothetical electricity coverage gap in Switzerland (Source: Prognos, 2011).**

3. The Different Launching Pads for Energy-Friendly Behavior

Energy-friendly behavior can be demonstrated in different energy-consumption domains, such as housing and mobility, and through the adoption of different conservation measures, such as investing in energy efficiency or changing use patterns. The various energy-friendly behaviors differ in terms of how difficult they are to implement, because they are associated with varying degrees of effort or are to a different extent affected by situational factors. As a consequence, they vary in their popularity (Kaiser, 1998). In the same vein, the low-cost hypothesis (Diekmann & Preisendörfer, 1992) postulates that people engage in pro-environmental behaviors that demand the least cost in terms of time or effort. As predicted by the low-cost hypothesis, it was, furthermore, shown that environmental concern primarily influences pro-environmental behaviors that are associated with low costs (Diekmann & Preisendörfer, 2003).

3.1. Energy-Related Consumption Domains

Energy consumption takes place in several domains, each of which individually provides opportunities to engage in energy-friendly actions. Four energy-consumption domains can be distinguished: housing, mobility, food, and consumer products and services (cf. BAFU, 2006). The latter domain includes all energy-related behaviors that are not addressed by the other domains, such as the purchasing of clothing and furnishings. With regard to energy conservation, the first three domains are of particular interest, since they account for the

largest percentage of energy consumed at the household level (Lorek & Spangenberg, 2001).

A further distinction that can be drawn within energy-consumption behaviors is between direct and indirect energy use. Households do not only use energy through, for example, heating or driving around in cars, thus directly using electricity, natural gas, or fuels. They also contribute to energy consumption in an indirect way by purchasing products and using certain services. The amount of energy used in the production, delivery, and disposal of goods and services is referred to as indirect energy use. As such, food consumption is related to indirect energy consumption, and consumers especially contribute to high consumption in this domain by, for example, buying non-seasonal products and goods from distant countries. Differentiation between direct and indirect use seems crucial, since consumers' acceptance of energy-saving measures differs, depending on whether these measures relate to direct or indirect energy use. Measures attempting to reduce indirect energy use were found to be less accepted than measures aiming to reduce direct energy use (Poortinga, Steg, Vlek, & Wiersma, 2003).

Further support for the notion to distinguish between energy-consumption domains stems from a study investigating the association between organic food consumption, transport, and energy consumption in the housing domain; this study found no significant relationships (Pedersen, 2000). Energy-friendly measures in the mobility domain, for example, generally seem to represent rather high-cost behaviors (Lindenberg & Steg, 2007) and thus are probably driven by other motivational factors than, for example, energy-saving actions in the housing domain. In line with this reasoning, Poortinga and colleagues (2003) found transport energy-saving measures to be less accepted than energy-saving measures in the home.

3.2. Types of Energy-Conservation Behavior

A In addition to different energy consumption domains, different types of energy-friendly behaviors can be distinguished. For example, Stern (2000) postulated four distinct types of environmentally significant behaviors that differ in their underlying determinants (Stern, Dietz, Abel, Guagnano, & Kalof, 1999): environmental activism, such as active involvement in environmental organizations; non-activist behaviors in the public sphere, such as the acceptance of public policies; private-sphere environmentalism, where environmental-friendly purchase and use of products and services are differentiated; and other environmentally significant behaviors, such as exerting an influence on the actions of organizations to which one belongs. Three types of *direct* energy-conservation measures that fall into the private-sphere environmentalism category can be distinguished (cf. Poortinga, et al., 2003): energy-efficiency measures, curtailment behavior, and shifts in consumption (e.g., purchasing regional foods). These three behavioral measures also proved to be accepted differently by consumers (Poortinga, et al., 2003). Individuals were most receptive to efficiency-based measures, and least receptive to shifts in consumption. Generally, a distinction is drawn between energy-conservation measures based on curtailment behavior and those based on the adoption of energy-efficient technologies (Black, Stern, & Elworth, 1985; Samuelson, 1990; Stern & Gardner, 1981). These two measures are psychologically different (Gardner & Stern, 2002). Energy-efficient measures represent "one-shot" behaviors that do not require any change in use behavior, but provide the same benefits in a less energy-consuming way; curtailment behaviors reduce benefits because consumers must alter their use patterns, which goes along with changes in everyday life in terms of the adoption of new habits and the adjustment of lifestyles. As a consequence, energy-efficiency measures are generally more accepted than curtailment behaviors (Poortinga, et al., 2003; Steg, Dreijerink, & Abrahamse, 2006). However, even though these direct energy-conservation measures have different characteristics, most research on consumers' energy-conservation behaviors has not sufficiently accounted for this differentiation. Previous studies have made no distinction at all (e.g., do Paco & Raposo, 2009), have not considered all behavioral measures (e.g., Jansson, Marell, & Nordlund, 2009), or have treated energy-efficiency measures and shifts in

consumption as one, subsuming them under the purchase-related measures category (e.g., Gilg, Barr, & Ford, 2005).

Consumers can also *indirectly* contribute to the reduction of energy consumption by supporting energy policies in terms of, for example, approval of regulations or tax increases aiming to reduce energy consumption. This indirect energy-conservation behavior falls into the category of non-activist behaviors in the public sphere mentioned above (Stern, 2000). Consumers' acceptance of policy measures was shown to be influenced by specific policy features, such as incentive versus disincentive measures (Steg, et al., 2006), as well as by attitudinal variables (Steg, Dreijerink, & Abrahamse, 2005).

4. Determinants of Energy-Friendly Behavior

Even though environmental consciousness and concern about energy problems is considerably high (Diekmann & Meyer, 2008), energy consumption continues to increase. Apparently, consumers do not act in line with their concerns, and there turns out to be an attitude-behavior gap, sometimes also called the value-action gap (Blake, 1999). Thus, energy-consumption behavior is not only driven by environmental or energy-related concerns, but there are also many other factors exerting an influence on final energy use behavior (for an overview, see Lutzenhiser, 1993; Wilson & Dowlatabadi, 2007). Aiming to account for this gap by identifying and describing intermediary variables between attitude and behavior, various frameworks and models have emerged that stress the importance of various influencing factors (for an overview, see Jackson, 2005; Wilson & Dowlatabadi, 2007). Two frameworks often used to predict energy-friendly and general pro-environmental behaviors are the theory of planned behavior (TPB) (Ajzen, 1991) and the value-belief-norm (VBN) theory of environmentalism (Stern, et al., 1999). These two theories are based on different approaches. TPB assumes that people make reasoned choices in choosing alternatives providing the highest benefit. The theory postulates that beliefs and evaluations about the outcomes of a behavior produce an attitude toward the behavior, which together with normative beliefs about others' expectations and perceived behavioral control results in a behavioral intention. This intention, in turn, is considered the immediate antecedent and key determinant of actual behavior. TPB has proven successful in predicting various pro-environmental behaviors (e.g., Bamberg & Schmidt, 2003; Kaiser & Gutscher, 2003).

VBN theory, on the other hand, is centered on moral norms and values and links value theory (cf. Stern & Dietz, 1994), the New Environmental Paradigm, that is, ecological worldview (Dunlap, Van Liere, Mertig, & Jones, 2000), and norm activation theory (Schwartz, 1977) in a causal chain. The model postulates that a person's ecological worldview, which in turn is determined by his/her values, predicts a person's awareness of consequences of a behavior, which subsequently determines self-ascribed responsibility to act, and finally results in a sense of moral obligation to act (i.e., personal norms). Personal norms in this model are considered the ultimate predictor of pro-environmental behavior. In a study conducted by Kaiser, Hübner, and Bogner (2005) that directly contrasted TPB and VBN, both models demonstrateed remarkable explanatory power: TPB's "intention" explained 95% of the variance in a person's conservation behavior and VBN's "personal norms" explained 64%. However, in general, regarding the models' ability to explain energy-friendly and pro-environmental behavior, TPB proved successful for high-cost behavior, such as car use (Bamberg & Schmidt, 2003), whereas VBN appeared to be more successful in explaining low-cost behaviors, such as political behavior (Gärling, Fujii, Gärling, & Jakobsson, 2003) or acceptance of policies (Steg, et al., 2005).

The determinants of environmentally-significant behavior can be roughly divided into four categories (Stern, 2000): attitudinal factors (hereafter called psychosocial factors), personal capabilities, contextual factors, and habits and routines. In the following, some of the varia-

bles forming part of the first three categories are briefly discussed, since these categories are in one form or another addressed in the present research project. Furthermore, the listing of variables is not claimed to be exhaustive, and only those variables that were of particular interest are elaborated on in more detail.

4.1. Psychosocial Factors

The category of psychosocial factors includes variables such as values, behavior-specific beliefs and norms, and attitudes in general as discussed above within the framework of TPB and VBN theory. Several studies found persons' concern for others to be predictive of their engagement in pro-environmental behavior. However, this construct was measured using different approaches and different labeling, such as altruism, social value orientation, or social preferences (cf. Murphy & Ackermann, 2012). In the following, the concept of social value orientation, which is based on the notion that human behavior takes place in situations of interdependence and is driven by individual goals, is described in more detail.

Given the situation of scarce energy resources, decisions related to energy conservation and consumption can be considered as representing a social dilemma (Samuelson, 1990) characterized by a conflict between acting according to personal short-term interests (e.g., such as savoring comfort without considering energy consumption) and acting according to collective long-term interests (i.e., an assured energy supply) (Dawes, 1980; Hardin, 1968). Thereby, in the short run, an individual is always better off acting according to his/her self-interests. However, given the case that most or all individuals behave in a self-interested way, personal as well as collective interests would be affected in the long term. In the case of energy consumption, this would be reflected in an insufficient energy supply. Even though according to rational choice (cf. Jackson, 2005) there is no reason to cooperate, certain individuals restrain their egoistic tendencies and act in accordance with collective interests. One factor that can account for these differences in behavior to a certain extent is a person's social value orientation; that is, the preference for allocation of a certain outcome to self and others, which represents a personality trait (for reviews, see Balliet, Parks, & Joireman, 2009; Bogaert, Boone, & Declerck, 2008; Van Lange, De Cremer, Van Dijk, & Van Vugt, 2007). Several social value orientations have been distinguished (cf. Van Lange, De Cremer, et al., 2007; Van Lange & Joireman, 2008); however, the three most prominent are the prosocial (maximizing joint outcomes and equality in outcomes), the individualistic (maximizing own outcomes), and the competitive (maximizing the difference between own and others' outcomes) value orientations. Individuals holding a competitive social value orientation generally constitute only a small part of the samples. For this reason, and because no differing predictions for competetive and individualistic individuals are made, research on social value orientation has generally subsumed persons with a competitive value orientation under the larger category of individualistic persons, thereby forming the social value orientation proself (Gärling, et al., 2003; Joireman, Van Lange, Kuhlman, Van Vugt, & Shelley, 1997; Van Vugt, Meertens, & Van Lange, 1995). The proself value orientation is considered to correspond to Schwartz's (1992) self-enhancement values, while the prosocial value orientation conforms to self-transcendence values. However, removing the differentiation between competitive and individualistic individuals results in the loss of possibly interesting information, especially when considering the theory of competitive altruism which points to the fact that pro-environmental behavior can also be driven by reputational concerns (for an overview, see Van Vugt, Roberts, & Hardy, 2007). The social value orientation approach has been applied to predict various pro-environmental behaviors. For example, it proved effective in explaining individuals' choice of means of transportation for commuting, providing evidence that prosocial individuals are more likely to commute by public transport, whereas proself individuals prefer to commute by car (e.g., Van Vugt, Van Lange, & Meertens, 1996). The general effect of social value orientation on pro-environmental behavior has been demonstrated in studies using hypothetical decision scenarios and experimental settings (Van Lange, Van Vugt, Meertens, & Ruiter, 1998; Van Vugt, et al., 1995; Van Vugt, et al., 1996), but the effect failed to reach significance when it came to self-reported real-life conservation behavior (Cameron,

Brown, & Chapman, 1998; Joireman, Van Lange, & Van Vugt, 2004; Van Lange, et al., 1998). As a consequence, the external validity of the social value orientation approach to energy-conservation behavior remains to be proven.

Beliefs about the efficacy of a behavior to attain a desired effect constitute further important determinants. There are several types of efficacy beliefs that can be differentiated. Thereby, it is crucial to distinguish whether the efficacy belief addresses a person's subjective capability to perform a behavior in terms of perceived control over the conservation behavior itself (i.e., self-efficacy) (Bandura, 1977) or the control over the outcomes of the behavior (i.e., the perceived efficacy in goal attainment) (Lam, 2006). The latter also forms part of models of health behavior, such as Roger's protection motivation theory (1975), and it can be further differentiated into perceived efficacy of the behavior in general (i.e., how successful a behavior is considered if people act together) and perceived efficacy of one's own behavior (i.e., how successful a person believes he/she can be by acting alone). The former is termed perceived response efficacy and corresponds to collective efficacy, while the latter is termed personal efficacy and corresponds to perceived consumer effectiveness as defined by Kinnear, Taylor, and Ahmed (1974). Studies showed that a person's beliefs that he/she is able to perform a specific conservation behavior (e.g., Axelrod & Lehman, 1993; Bamberg & Möser, 2007; Lindsay & Strathman, 1997), that a particular action (in general) is successful in achieving a desired outcome (Martens & Rost, 1998), and that his/her own efforts are effective in attaining a particular conservation goal (Gilg, et al., 2005; Roberts, 1996; Straughan & Roberts, 1999) are driving forces for pro-environmental and energy-conservation behavior.

Perceived costs and benefits also form part of the psychosocial factors category. A major issue that represents a barrier to conservation behavior is probably the aim to maintain comfort and convenience (Samuelson & Biek, 1991). Consumers consider energy-conservation behaviors acceptable as long as they do not conflict with utility derived from consumption, such as comfort. Certain individuals would rather pay to uphold comfort than to give up some quality of life (Gatersleben, 2001).

4.2. Personal Capabilities

This category of influencing factors includes knowledge and skills required to perform a particular behavior, availability of time, and general capabilities and resources, such as money and social status (Stern, 2000). Generally speaking, this category refers to all the capabilities required to perform a specific behavior. It is commonly agreed upon that only a small fraction of pro-environmental behavior can be explained by environmental knowledge. Thus, environmental knowledge represents no prerequisite for pro-environmental behavior but is considered to rather have an indirect impact (cf. Kollmuss & Agyeman, 2002).

Sociodemographic variables can also be considered to be part of the personal capabilities category, as they may be indicators of or proxies for personal capabilities (Stern, 2000). In general, regarding sociodemographic characteristics, the existing picture of the energy saver is a person who is young (e.g., Sardianou, 2007; Walsh, 1989), female (e.g., Morrison & Gladhart, 1976; Olli, Grendstad, & Wollebaek, 2001; Roberts, 1996), well-educated (e.g., Olli, et al., 2001; Olsen, 1983), and wealthy (e.g., Dillman, Rosa, & Dillman, 1983; Long, 1993; Sardianou, 2007). However, research aiming to describe energy consumers based on sociodemographics found very contrasting results and revealed only limited explanatory power of sociodemographics in explaining pro-environmental behavior (for a review, see Diamantopoulos, Schlegelmilch, Sinkovics, & Bohlen, 2003). In a recent study, Abrahamse and Steg (2009) showed that energy savings (i.e., changes in energy use) are merely related to psychological variables, whereas energy use is determined by sociodemographic variables.

4.3. Contextual Factors

There generally exists a tendency to attribute behavior to dispositional factors without considering situational influences, which is called the "fundamental attribution error" (Ross, 1977). Contextual and situational factors are crucial when it comes to explaining pro-environmental behavior (e.g., Black, et al., 1985; Collins & Chambers, 2005; Corraliza & Berenguer, 2000). Examples of theoretical models aiming to incorporate contextual impacts include the Attitude Behavior Context (ABC) theory (Guagnano, Stern, & Dietz, 1995; Stern, 2000) and the motivation-ability-opportunity (MAO) model (Ölander & Thogersen, 1995). ABC theory describes the interaction of attitude, behavior, and context as an inverted U-shaped function, with the attitude-behavior association being the strongest when contextual forces are neutral and the weakest when contextual factors are strongly positive (i.e., enforcing a behavior) or negative (i.e., banning a behavior). The MAO model (Ölander & Thogersen, 1995) considers situational factors in the opportunity concept as "objective preconditions for the behavior" (p. 365). Contextual factors include influences such as monetary issues, physical capabilities, public policy support, and interpersonal influences (e.g., social norms).

Consumption behavior is embedded in social context; therefore, individuals' behaviors are shaped by social factors, such as social norms. The influence of social norms on a person's behavior is described in the focus theory of normative conduct (Cialdini, Kallgren, & Reno, 1991). Two types of social norms are differentiated: the descriptive norm, referring to what is perceived to be commonly done in a specific situation, and the injunctive norm, describing what is perceived to be commonly approved or disapproved of (i.e., what should be done). Representing a socially significant behavior, the potential impact of social norms was also demonstrated for pro-environmental behaviors (e.g., Thogersen, 2008). For example, in a study on the reuse of towels, providing hotel guests with a descriptive norm message resulted in higher compliance with the environmental request to reuse towels than the standard environmental message (Goldstein, Cialdini, & Griskevicius, 2008). However, due to people's tendency to strive for conformance with the standard, provision of a descriptive norm may provoke the opposite effect, more precisely, a boomerang effect, as people already consuming less energy than the norm might increase their consumption (i.e., the undesirable behavior). This boomerang effect can be prevented by adding injunctive norms confirming that the shown behavior (i.e., energy conservation) is approved (Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007).

4.4. Excurse: Focus Groups Insights

A In May 2009, in the run-up to the studies forming the basis of the present research project, two focus groups, each consisting of seven participants, were conducted. The aim of the focus groups was to get a general insight into energy consumers' ways of thinking that drive their behaviors, which could serve as a basis to identify issues that should be addressed in the following studies and to generate specific ideas. In this section, the most interesting insights and inputs gained from focus groups with regard to motives, attitudes, and beliefs underlying energy consumption-related behavior are briefly outlined.

From the conducted focus group discussions, it emerged that concerns about comfort and convenience and expenditure of time represent decisive criteria for the decisions on whether to engage in energy-friendly behavior, and thus, they often constitute a barrier to energy conservation. Financial motives were mentioned as another important behavioral driver. On the one hand, financial considerations may promote energy-conservation behavior; on the other hand, they may represent a barrier, since, for example, buying a train ticket to use public transport or adopting of certain energy-efficiency measures (e.g., house insulation/renovation), are considered too expensive.

Focus groups also revealed other motives that may underlie energy-consumption or energy-conservation behaviors, such as health and safety concerns. For example, acting energy-friendly in terms of driving by bicycle can also be motivated by the desire to do something for one's health. Furthermore, the reason for turning off stand-by may be to reduce the risk of fire, and driving slowly on highways may be due to safety issues. On the other hand, safety concerns may also result in energy-intensive consumption behavior. Participants, for example, reported that a big car (e.g., SUV) is perceived as providing more safety and that a faster, more energy-consuming car is also related with more safety, since it allows for the fast (i.e., safe) overtaking of other cars. As emerged from focus groups, people's need for quality and performance is sometimes not compatible with energy-friendly behavior and thus constitutes a behavioral barrier. Participants, for example, reported that completely filling the washing machine would not yield satisfactory results with regard to the cleanliness of the laundry. Furthermore, energy-efficiency measures can be conceived of as going along with a loss in performance. Focus group participants, for example, perceived energy-saving light bulbs as giving off no comfortably warm light.

Participants also addressed contextual forces in terms of social norms, indicating that nowadays, one is nearly forced to behave in an energy-friendly manner due to society's expectations. Furthermore, conservation behaviors were described as fundamentally anchored, as participants reported that they were brought up to save energy and that energy conservation was thus understood. Feelings of responsibility were mentioned as another driver of energy-friendly behavior. There were also several other barriers outlined in focus group discussions, such as a lack of perceived personal efficacy to make a change through one's own conservation efforts. Moreover, one participant brought up a concern related to the free rider problem, stating that if he does not buy the cheaper energy-inefficient appliance, another person will. Another interesting statement was related to the purchase of organic produce, where participants pointed to the exaggerated and inaccurate product claims that, consequently, result in a lack of trust in product labels and in the efficacy of purchase-related energy-friendly behavior.

5. One Size Does Not Fit All – Categorization of Energy Consumers

The above listing of the numerous types of energy-conservation behavior and the determinants driving energy-consumption and -saving behavior makes it clear that there exist various energy consumer types. These consumer types differ in their willingness to engage in the individual conservation behaviors and they differ in the characteristics of the behavioral drivers. Thus, to effectively address the individual consumer types and to bring about the desired changes in consumption behavior, tailored communication and marketing campaigns that specifically address the needs and desires of the individual energy consumer types are necessary. The provision of tailored information was also pointed out by Steg (2008) as an important future research topic. However, before designing targeted intervention campaigns, it is necessary to identify and describe the different energy consumer types in a first step and to tag issues and opportunities for each type.

There are different ways to segment energy consumers. Energy-friendly, or pro-environmental, consumers have been categorized based on different variables over the past years. For example, speed of adopting innovations such as energy-efficient products (Egmond, Jonkers, & Kok, 2006); degree of opinion leadership (Davis & Rubin, 1983); motives and goals that underlie behaviors (Smeesters, Novoseltsev, & Warlop, 2001); attitudes and beliefs (Hunecke, Haustein, Bohler, & Grischkat, 2010; Vicente & Reis, 2007); and behaviors (Roberts, 1995), are just a few. Generally, two approaches are distinguished: profiling methods based on sociodemographic characteristics and profiling methods based on psychographics and behavioral criteria. Extensive research has been conducted using sociodemographic characteristics as the basis for the segmentation and profiling of green con-

sumers (cf. Diamantopoulos, et al., 2003). However, sociodemographics performed poorly in predicting energy friendliness compared to attitudinal and behavioral variables (e.g., Diaz-Rainey & Ashton, 2010; Rowlands, Scott, & Parker, 2003). Consequently, even though sociodemographic data are more readily available and related insights are probably easier to transfer into marketing and advertising strategies, they seem less suitable to serve as a segmentation base.

Few studies exist specifically profiling energy consumers by applying a cluster analytic approach. Exceptions include two segmentation studies conducted in Germany that used general values, lifestyle, and general consumption patterns as a segmentation base (Prose & Wortmann, 1991; Wortmann, Schuster, & Klitzke, 1996). However, when it comes to developing marketing strategies specifically targeting the different energy consumer types, behavior and behavioral variables are preferable (Rossiter & Percy, 1987). Thereby, to guarantee a more differentiated and comprehensive picture of the different energy consumer types, it is essential to distinguish between the different conservation types (curtailment, energy-efficiency measures, shifts in consumption) and domains (housing, mobility, food). Segmentation studies on general pro-environmental behavior that have used a cluster analytic approach in this direction exist, but these studies only distinguished between these conservation types in a less distinctive or incomplete way (Barr, Gilg, & Ford, 2005; Jansson, et al., 2009). Consequently, an energy-consumer segmentation based on the different types of conservation behaviors and distinct behavioral determinants remains to be researched.

6. Reliance on Heuristics and Trait Inferences

Up to this point, differences between energy consumers have been elucidated. However, there are several characteristics energy consumers share, more precisely, there are characteristics that people in general have in common. People share the tendency to rely on simple rules of thumb to arrive at a decision in an efficient, timesaving way (Kahneman, 2003). Furthermore, a common sense about the symbolic meanings of objects and behaviors exists that people use as a basis to draw inferences regarding the personality of others (for an overview, see Charon, 2007). In both cases, decision-making relies on only limited information, bearing the risk of misperceptions. These misperceptions may exert a negative impact on energy-related decisions, as they may result in distorted judgments and, ultimately, inaccurate conservation and consumption behaviors.

6.1. Application of Heuristics and Resulting Misperceptions

Although people show considerable awareness and concern with regard to problems related to energy use (e.g., Diekmann & Meyer, 2008), they have a hard time assessing the energy use associated with their consumption behavior. There exist several misperceptions related to energy consumption. Consumers, for example, generally perceive energy-saving strategies in terms of curtailment and behavioral changes as more effective than energy-efficiency improvements when it comes to energy conservation (Attari, DeKay, Davidson, & de Bruin, 2010; Kempton, Harris, Keith, & Weihl, 1984). Furthermore, regarding energy use and savings, consumers generally show a tendency to slightly overestimate low-energy behavior and largely underestimate high-energy behavior (Attari, et al., 2010).

Misperceptions like these may result from people's application of simple rules of thumb (i.e., heuristics) (Tversky & Kahneman, 1974). People rely on heuristics in situations of limited time, knowledge, and computational capacity in order to arrive at decisions in a timesaving way (Kahneman, 2003). Thereby, the decision is achieved by ignoring part of the provided information. Kahneman and Frederick (2002) described the use of heuristics as a process of attribute substitution; that is, a target attribute that is not readily available is assessed by

substituting an associatively related attribute that comes easier to mind (i.e., the heuristic attribute). However, due to the inclusion of only limited information (and thus the neglect of other information), the informational attributes focused on are overweighted, which can consequently result in misperceptions and misjudgments.

Heuristics are also relied on in decisions and judgments related to energy consumption. Several heuristics applied to estimate energy consumption have been identified. Consumers, for example, tend to base their energy-consumption estimations on characteristics such as the visibility of energy consumption, thus overestimating the energy consumed through lighting (Kempton & Montgomery, 1982). Furthermore, for estimations of energy consumption related to appliances, people rely on characteristics such as size (Baird & Brier, 1981; Kempton, et al., 1984; Schuitema & Steg, 2005) and running time of appliances (Kempton & Montgomery, 1982), assuming that the larger the appliance and the longer it is running, the more energy it consumes. The identification of heuristics underlying estimations of energy consumption is crucial to understanding people's information processing and thus the cause of any possible misperceptions. The insights gained can subsequently serve as a basis for the development of intervention strategies. Preventing misperceptions arising from the application of heuristics that can result in suboptimal decision-making related to energy consumption could enforce a more deliberate judgment and decision-making process, which could lead to more thoughtful energy-consumption behavior.

6.2. The Symbolic Meaning of Behavior

Social context exerts considerable impact on individuals' behaviors in various ways: for example, through established social heuristics facilitating social interaction (cf. Gigerenzer & Gaissmaier, 2011), through social norms resulting in a perceived social pressure to conform (Cialdini, et al., 1991), and through the attribution of symbolic meaning to behavior and behavioral objects (Blumer, 1969; for an overview, see Charon, 2007). Behavior is not simply an act; it always carries meaning. Through his or her behavior, a person always indirectly makes a statement about his or her values and convictions. The symbolic meaning a behavior or object carries is constructed and attributed to in the course of social interactions (Blumer, 1969; Mead, 1934) and, as such, is generally agreed upon. Symbolic meanings are constantly renegotiated to fit with current social norms.

As behaviors are attributed a symbolic meaning, it leads one to suspect that consumers could also engage in behaviors, particularly the ones that are especially socially shaped, for symbolic reasons. The consumption of material goods is assumed to fulfill three functions: instrumental, symbolic, and affective (c.f. Steg & Vlek, 2009). Symbolic motives, or meanings, can be further subdivided into two components (Morton, Schuitema, & Anable, 2011): the motive to express one's social status and the motive to express one's personal identity and values, such as energy friendliness. With regard to car use and the purchase of energy-friendly cars, research has supported the notion that symbolic motives are important behavioral drivers in terms of expression of social status (Peters, Gutscher, & Scholz, 2011; Steg, 2005) as well as in terms of expression of fuel economy or environmental friendliness as an important value (Heffner, Kurani, & Turrentine, 2007; Turrentine & Kurani, 2007). Previous research has mainly focused on functional or instrumental attributes when investigating motivations underlying the purchase and use of goods. Thus, further research on symbolic motives driving product use and purchase might be rather promising when it comes to the development of interventions to motivate consumers to reduce energy consumption.

People do not only engage in symbolic meaningful behaviors in order to express their personal identity and values, such as energy friendliness, and to communicate them to a social audience. They also make use of the symbolic meaning of others' behaviors to draw inferences on their personality traits. People, for example, were shown to draw inferences on a person's characteristics in terms of the Big Five personality factors based on the pro-

environmental behaviors he/she performed (Skippon & Garwood, 2011). Research, furthermore, suggests that people ascribe a personality trait to a person based on limited information and that there exists high consensus concerning the symbolic significance of behaviors with regard to environmental friendliness and unfriendliness (Sadalla & Krull, 1995).

The various energy-related behaviors are to differing degrees subject to social interaction and differ in intensity of media coverage. As a result, it can be assumed that they differ in their symbolic significance regarding a person's energy friendliness or energy unfriendliness. Thus, the symbolic significance of energy-related behaviors might represent an ideal heuristic attribute when it comes to assessing consumers' energy consciousness or even energy consumption, resulting in judgments that are mainly based on energy-related behaviors of high symbolic significance.

7. Overview of the Research Project

In order to provide a useful informational basis for the development of tailored intervention strategies, a first aim of the present research project was to identify and describe the different energy consumer types. To arrive at a differentiated picture of the individual energy consumer types, the various domains and types of energy-conservation behavior were distinguished as they differ in consumers' willingness to adopt them (see Section 3). Furthermore, various crucial determinants of energy-use behavior were considered (see Section 4). Addressing the issue of misperceptions in energy-consumption judgments that arise due to the use of heuristics and acknowledging the impact of social interactions on the shaping of people's interpretations of others' behaviors (see Section 6), a further aim of the present research project was to provide evidence of people's reliance on a heuristic called the *symbolic significance heuristic*.

The present research project consists of five chapters (see Table 1.1). Starting with a general introduction, two chapters dealing with the classification and description of energy consumer types and one chapter investigating people's reliance on the symbolic significance heuristic follow. The research project concludes with a general discussion of the study findings and their implications. For the following chapters, a brief description is given below.

The Impact of Social Value Orientation on Energy Conservation in Different Behavioral Domains

People differ in their social value orientations (i.e., whether collective long-term interests or personal short-term self-interests prevail), which is reflected in a different willingness to perform energy-friendly behaviors (Section 4.1). However, there exist different domains and types of energy-conservation behaviors, and these behaviors are to differing degrees in conflict with self-interests (see Section 3). To this point, research on social value orientation and energy-friendly or pro-environmental behavior has made no distinction between the various energy-consumption behaviors. Therefore, investigating the energy-conservation efforts of people with different social value orientations by applying a more differentiated approach with regard to energy-consumption domains and types of energy-conversation measures was the subject of the study presented in Chapter II.

A large-scale mail survey was conducted including participants from the German- and French-speaking parts of Switzerland. The study distinguished between curtailment behaviors of different energy-consumption domains (housing, mobility, and food) and between different types of energy-conservation measures (curtailment and energy efficiency). Furthermore, behavioral motives reflecting the different social value orientations were assessed.

Results showed that over all energy-consumption domains (housing, mobility, and food), prosocial energy consumers performed the most energy-conservation behaviors based on curtailment, followed by competitive and individualistic consumers. However, the three social value orientation classes did not differ in their adoption of energy-efficiency measures, though their efforts were driven by different motives; competitors and individualists were more interested in the financial benefits gained from conservation than prosocials, while the latter were more driven by energy consciousness.

Who Puts the Most Energy into Energy Conservation? A Segmentation of Energy Consumers Based on Energy-Related Behavioral Characteristics

To effectively address and motivate consumers to reduce energy consumption, tailored intervention and communication campaigns are essential. For a precise identification and detailed description of the different behavioral opportunities of energy consumer types and corresponding starting points for interventions, it is essential to differentiate between the various conservation behavior types (see Section 3). The few studies that have used behavioral variables as a segmentation base either have not differentiated between the various types of conservation behaviors or have done so only in a less distinctive or incomplete way (see Section 5). Consequently, the aim of the study depicted in Chapter III was to identify and describe the different energy consumer types using a much more differentiated approach with respect to the distinction of different energy-conservation behaviors and a more comprehensive approach with regard to considered energy-related psychosocial factors.

The study assessed different energy-conservation behaviors. It distinguished between direct and indirect energy-friendly behavior and between conservation actions based on curtailment, shifts in consumption, and energy efficiency. Furthermore, the study differentiated between energy-consumption domains (housing, mobility, and food). Besides the separately considered conservation behavior types, various psychosocial variables (beliefs, attitudinal and motivational variables) formed the segmentation base and were subjected to cluster analysis. Data were derived from a large-scale mail survey conducted in the German- and French-speaking parts of Switzerland.

Six energy consumer segments were identified and a detailed description provided: the idealistic, the selfless inconsequent, the thrifty, the materialistic, the convenience-oriented indifferent, and the problem-aware well-being-oriented energy consumer. All segments showed different behavioral patterns with regard to types of energy-conservation actions performed, supporting the notion of using a broader and more distinct behavioral base to arrive at an adequate and differentiated description of energy consumer types.

Does the Energy-Friendly SUV Driver Exist in People's Minds? The Reliance on Symbolic Significant Behavioral Attributes when Judging Others' Behaviors

The use of heuristics may result in misjudgments with regard to energy consumption related to a specific behavior (see Section 6.1), which may in turn represent barriers to the adoption of effective energy-conservation behaviors, as consumers, for example, do not adequately estimate the energy-saving potentials of various conservation behaviors. Chapter IV provides evidence for the application of a heuristic that is assumed to come into play in decision situations on subjects that are especially socially shaped, such as energy friendliness. The postulated heuristic stresses the decisiveness of behaviors' symbolic meaning, attributed through social interactions (cf. Section 6.2), and is called the *symbolic significance heuristic*. The heuristic postulates that people rely on symbolic significant behavioral attributes while largely ignoring other neutral or less symbolic significant information.

Five experimental studies in the form of online studies were conducted to provide support for the application of the *symbolic significance heuristic*. Thereby, the focus shifted from judging

general energy consciousness based on the presented behavioral information (symbolic significant and symbolic neutral) to specifically judging energy consciousness related to the described behavior and further to directly judging energy consumption. Moreover, to test for the stability of the symbolic significance fallacy, decision situations were designed in a way that allowed for a 100% adequate judgment. Furthermore, several alternative explanations for the effect were ruled out.

Findings supported the notion of people's use of the *symbolic significance heuristic*, showing that the energy consciousness of persons with behaviors that are symbolic significant for energy friendliness is overestimated and energy consumption is underestimated, while the energy consciousness of persons with behaviors that are symbolic significant for energy unfriendliness is underestimated and energy consumption is overestimated. The symbolic significance fallacy was demonstrated to be generalizable to different energy-consumption domains and proved to be of remarkable robustness.

General Discussion

The present research project concludes with a general discussion highlighting and integrating the central findings of the research chapters and drawing parallels. Furthermore, limitations of the present research project are discussed, and suggestions for future research are provided. The general discussion ends with an elaboration on the implications of the findings for the development of interventions to promote energy-friendly behavior.

Table 1.1. **Overview of the Research Project: Chapters, Main Research Questions and Applied Methods**

Chapters and main research questions	Methods
I General introduction	
II The impact of social value orientation on energy conservation in different behavioral domains • Does the impact of social value orientation on curtailment behavior persist across the housing, mobility, and food domains? • Does the type of energy conservation measure moderate the impact of social value orientation on energy-saving behavior?	*Focus groups & Mail survey*
III Who puts the most energy into energy conservation? A segmentation of energy consumers based on energy-related behavioral characteristics • Are there specific segments of energy consumers that differ with regard to the energy conservation measures in which they are engaged? • Does a differentiated consideration of the various domains and types of energy-conservation behaviors reveal new segments?	*Focus groups & Mail survey*
IV Does the energy-friendly SUV driver exist in people's minds? The reliance on symbolic significant behavioral attributes when judging others' behaviors • Do people rely on behavioral attributes with high symbolic significance while neglecting other attributes when judging others' energy consciousness, thus resulting in misperceptions? • Does the effect hold true for various consumption domains? • Does the effect withstand gains in evaluability? • Does the effect persist when directly asked to judge energy consumption, thereby providing all information necessary to calculate energy consumption?	*Online experiments*
V General discussion	

The Impact of Social Value Orientation on Energy Conservation in Different Behavioral Domains

1. Introduction

Confronted with the decreasing amount of fossil energy sources and the increasing energy demand, individuals are required to make greater efforts to ensure future energy supply on one hand and to reduce pollution on the other hand (Asif & Muneer, 2007). Thus, individuals face a situation in which individual short-term interests, such as comfort and convenience, conflict with collective long-term needs, such as assured energy supply and avoidance of environmental pollution. Which interest prevails, depends to a certain extend on personality characteristics, such as values, norms, and motives (Stern, 1999, 2000; Van Vugt, 2009). One aspect of personality is an individual's social value orientation, which reflects the preference to allocate a specific outcome to oneself and others (Messick & McClintock, 1968). So far, research on proenvironmental behavior involving energy conservation has successfully detected the effect of social value orientation in experimental designs using hypothetical scenarios, but has failed to show the effect based on self-reported energy conservation behavior. Furthermore, research has mainly focused on mobility, and other energy consumption domains have been neglected. Consequently, the goal of the present study is to provide validity of the social value orientation approach in predicting actual energy conservation behavior, and to expand the investigation of the social value orientation effect to different energy consumption domains, thereby testing for its persistence over different domains, namely housing, food, and mobility. A further research question is based on the fact that two types of measures to conserve energy exist: conservation behaviors based on curtailment and conservation behaviors based on energy efficiency (Samuelson, 1990; Stern & Gardner, 1981). These measures are different in their nature because they require different levels of effort, and they have other determining factors, such as investment costs. Thus, the second goal of this study is to shed light on the question whether the type of energy conservation measure is a moderating factor on the differences in energy conservation behavior between individuals with different social value orientations.

1.1. The Impact of Social Value Orientation on Proenvironmental Behavior

As with many other environmental decisions involving problems of scarce resources (Hardin, 1968; Stern, 1992; Thompson & Stoutemyer, 1991), decisions related to energy use can be perceived as a social dilemma (Samuelson, 1990). Social dilemmas are characterized by the presence of a conflict between personal short-term interests and collective long-term interests (Dawes, 1980; Hardin, 1968; Messick & Brewer, 1983). A characteristic of social dilemmas is that acting in a self-interested way generally yields more advantageous outcomes for the individual in the short run, such as comfort. However, if most or all individuals behave in a self-interested way, both personal and collective interests will be affected in the long run in terms of, for example, increased pollution and insufficient energy supply.

People differ in their response to a social dilemma situation. A factor that determines whether an individual shows cooperative or self-interested behavior is social value orientation, which is a personality trait (for reviews, see Balliet, et al., 2009; Bogaert, et al., 2008; Van Lange, De Cremer, et al., 2007). Social value orientation reflects an individual's disposition to allocate specific outcomes to oneself and others (Kuhlman & Marshello, 1975; Messick & McClintock, 1968). Three different kinds of social value orientation are distinguished (Parks, 1994; Van Lange & Liebrand, 1991): prosocial persons aim to maximize others' outcome or joint outcome; competitive persons are more inclined to maximize their own gain relative to the others' gain; and individualistic persons solely attempt to maximize their own outcome with little or no regard to how much the others receive.

The concept of social value orientation has proved to be valid in experimentally created social dilemmas (Kramer, McClintock, & Messick, 1986; McClintock & Liebrand, 1988) and in real life social dilemmas, such as helping situations, close relationships, donations, and water scarcity (Bonaiuto et al., 2008; McClintock & Allison, 1989; Van Lange, Agnew, Harinck, & Steemers, 1997; Van Lange, Bekkers, Schuyt, & Van Vugt, 2007). Studies revealed that prosocial individuals generally showed more cooperative behavior than individualistic and competitive individuals. Given that everyday proenvironmental decisions can be defined as social dilemmas, the approach of social value orientation has been applied to predict proenvironmental behavior, such as commuting behavior (Joireman, et al., 2004; Van Lange, et al., 1998) and proenvironmental political behavior (Cameron, et al., 1998; Gärling, et al., 2003; Joireman, Lasane, Bennett, Richards, & Solaimani, 2001). However, as we will see, these studies found mixed results.

1.2. Social Value Orientation and Energy Conservation Behavior in Different Domain

Energy consumption is involved in different domains of our everyday life, such as housing, mobility, and food. Existing research about social value orientation and energy conservation behavior has focused mainly on mobility, more precisely people's commuting preferences (e.g., Joireman, et al., 2004; Van Vugt, et al., 1995). For example, studies on commuting behavior found evidence that prosocial persons are more likely to commute by public transporttation, whereas individualistic and competitive persons prefer to commute by car (Van Vugt, et al., 1995; Van Vugt, et al., 1996). However, studies that found a general effect of social value orientation on commuting preferences often presented subjects with hypothetical commuting scenarios in an experimental setting (e.g., Van Lange, et al., 1998, Study 1; Van Vugt, et al., 1995; Van Vugt, et al., 1996). Van Vugt et al. (1996), for example, presented commuters with a hypothetical commuting situation they would face in ten years. Several independent variables were manipulated (e.g., relative travel time of public transportation versus car), and participants were subsequently asked to indicate their preferred mean of transportation for covering the distance to work (i.e., by car or by train). Results revealed that prosocials exhibited a greater overall preference for public transportation than individualists and competitors. Research applying the approach of social value orientation on self-reported commuting behavior has often failed to show the expected general effect of social value orientation (e.g., Joireman, et al., 2004; Van Lange, et al., 1998, Study 2). Based on participants' actual commuting situations, Van Lange et al. (1998, Study 2) asked commuters to indicate their preference for commuting by taking a car alone or by carpooling. Consistent with other studies that used self-reported behavior, Van Lange et al. (1998, Study 2) failed to detect a general effect of social value orientation. Hence, an external validation of the social value orientation approach regarding self-reported energy conservation behavior is still lacking.

Besides mobility, two other domains play an important role in energy consumption, namely housing and food (Lorek & Spangenberg, 2001). The housing domain includes activities such as heating, washing, and ventilating. People's food purchase behavior is associated with indirect energy use that corresponds to the amount of energy used by the production and delivery of a certain food product. For example, buying regional food products causes less energy use than buying food flown in from a distant country. Previous studies that investigated the issue of social value orientation, focusing on scarce environmental resources, have never distinguished between different domains. They either combined different resource conservation behaviors of different domains (such as recycling, conserving energy, and supporting environmental organizations) and formed a general measure of proenvironmental behavior (e.g., Cameron, et al., 1998), or they examined only one energy consumption domain (e.g., Joireman, et al., 2004). People's acceptance of conservation behaviors, however, was found to vary depending on the respective energy consumption domain (e.g., Pedersen, 2000; Poortinga, et al., 2003). Considering the differences in willingness to conserve energy, depending on the energy conservation domain, the question arises whether social value orientation has an impact on energy conservation behavior in various energy consumption do-

mains. For this reason, this study distinguishes the three energy consumption domains with the largest impact on environment (Lorek & Spangenberg, 2001): housing, food, and mobility.

Since the effect of social value orientation has been detected in previous studies using hypothetical settings (Van Vugt, et al., 1995; Van Vugt, et al., 1996), but not in studies assessing actual conservation behavior (Cameron, et al., 1998; Joireman, et al., 2004), a main goal of this study is to demonstrate the impact of social value orientation on behavioral issues related to energy conservation. Unlike other studies, we did not measure consumer's behavioral intentions in hypothetical situations, but we measured self-reported behavior of a consumer's everyday life.

Based on the above discussion regarding the characteristics of the three social value orientations and the differentiation of energy consumption domains, the following hypotheses are postulated:

Hypothesis 1a. There is a significant main effect of social value orientation for everyday energy conservation behaviors, more precisely, behaviors that have to be repeatedly performed (hereafter referred to as curtailment behaviors); prosocials show significantly more frequently energy conservation behaviors than individualists and competitors.

Hypothesis 1b. There is no difference in the relationship between social value orientation and curtailment behavior for the different energy consumption domains; more specifically, there is no interaction between social value orientation and energy consumption domain.

Hypothesis 1c. The differences in energy conservation behavior between the three social value orientation classes are based on specific motives reflecting their way of thinking; prosocials perform highest on prosocial motives underlying energy conservation behavior (e.g., concern for the future of the next generation), whereas individualists rate individualistic motives (e.g., loss of comfort) and competitors rate competitive motives (e.g., concern that others benefit) highest as a reason for not engaging in energy conservation behavior.

1.3. Type of Energy Conservation Measure and Underlying Behavioral Motives

Two types of energy conservation measures exist: conservation behaviors based on curtailment and conservation behaviors based on adoption of energy-efficient technologies (Samuelson, 1990; Stern & Gardner, 1981). Curtailment behavior refers to conservation behaviors that an individual has to perform repeatedly and that require a change in one's everyday energy use habits (Aarts & Dijksterhuis, 2000; Marechal, 2009) and adjustments in lifestyle (Gilg, et al., 2005; Schipper, Bartlett, Hawk, & Vine, 1989), such as reducing the heating, buying regional food, and carpooling. Contrarily, energy efficiency behaviors generally require only one specific action, such as the purchase of an energy-efficient appliance, that has a long-term effect on energy conservation and that is not related to any change in habits. Such technical measures are always associated with an initial investment, but they often pay out in the long run. The two conservation measures are psychologically different (Gardner & Stern, 2002; Stern & Gardner, 1981). As opposed to a technical solution that offers the same benefits in a less energy consuming way, curtailment behavior leads to a reduction of benefits since it is often associated with increased effort and decreased comfort. Accordingly, individuals are more receptive to conservation behaviors based on energy efficiency (Poortinga, et al., 2003; Steg, et al., 2006). In a recent study, for example, Steg and colleagues (2006) revealed that policies targeting energy efficiency behaviors are perceived more acceptable and more effective than curtailment behaviors.

Individualistic and competitive individuals are characterized by a self-interested way of thinking, which is, for example, reflected in their interest in financial benefits and comfort. Thus, it might be assumed that these individuals are more inclined to engage in energy conservation behaviors related to energy efficiency, as compared to behaviors based on curtailment behaviors, since energy efficiency behaviors also offer financial benefits, but require no restriction of comfort. For prosocial individuals, however, such a differentiation should not exist. Accordingly, it is expected that, in contrast to everyday energy conservation behaviors involving curtailment, social value orientation classes do not differ in energy conservation behaviors based on energy efficiency. This assumption is strengthened by a recent study that failed to demonstrate social value orientation as a discriminating variable between participants buying energy-efficient light bulbs and participants not buying energy-efficient light bulbs (Gupta & Ogden, 2009). Furthermore, several studies provided evidence that a self-interested way of thinking reflected in behavioral motives commonly perceived as selfish, such as striving for status and luxury, is not necessarily contradictory to energy conservation behavior, but may even be a driving factor for energy conservation (De Young, 2000; Griskevicius, Tybur, & Van den Bergh, 2010; Van Vugt, et al., 2007). Based on the above reasoning, a further aim of this study is to provide evidence that the type of energy conservation measure is a crucial determinant of the differences in energy conservation behaviors between the social value orientation classes.

As previously mentioned, unlike in the case of energy conservation behaviors based on curtailment, we did not expect to observe an effect of social value orientation for energy efficiency behaviors. Although prosocials, individualists, and competitors are assumed to show an equal tendency in performing energy efficiency behaviors, the underlying motives are expected to differ. As prosocial individuals are more likely to consider collective consequences, it is assumed that in applying energy efficiency behaviors, they are driven mainly by energy consciousness. In contrast, individualistic and competitive individuals are more concerned about their personal interests, which might be reflected in a more financial motivation to engage in energy efficiency behaviors. Based on this reasoning, the following hypotheses are proposed:

Hypothesis 2a. There is an interaction effect between social value orientation and type of energy conservation measure; prosocial, individualistic, and competitive individuals do not differ in the adoption of energy conservation behaviors based on energy efficiency as opposed to conservation behaviors based on curtailment which are most frequently performed by prosocial individuals.

Hypothesis 2b. Prosocial individuals rate energy consciousness highest as a motivation to engage in energy efficiency behaviors, whereas individualistic and competitive individuals rate financial motives highest as a motivation for the adoption of energy efficiency behaviors.

2. Method

2.1. Participants and Procedure

A total of 1,209 persons participated in the current study. About one-third, 32.5% (n = 393), of the participants were residents of the French-speaking part of Switzerland and about two-thirds, 67.5% (n = 816), of the German-speaking part. The sample consisted of 492 (41.2%) women and 703 (58.8%) men. Fourteen subjects failed to indicate gender. The average age was 51.9 years (SD = 15.22). Participants ranged in age from 18 to 92 years. Average age of the sample and gender distribution slightly differed from Swiss population, since the average age is approximately 48 years and women constitute 50.8% of the Swiss population (BFS, 2009).

Data were collected by sending a questionnaire to a random sample of 3,731 households in the German- and French-speaking parts of Switzerland, drawn from the telephone directory. The mailing comprised an accompanying letter describing the aim of the study and ensuring absolute anonymity. The next-birthday method was applied to quasi-randomly assign questionnaires within households; the member of the household who was aged 18 years or older and would have the next birthday was asked to fill in the questionnaire. Data were collected from mid-November 2009 to the end of January 2010. A total of 179 questionnaires were undeliverable because the address was no longer valid due to relocation or death of the addressee. A further 73 questionnaires could not be filled in due to advanced age or because recipients were not sufficiently proficient in the language in which the questionnaire was written. Until the end of the data collection period, 1,506 questionnaires were returned, which corresponds to an adjusted response rate of 43.3%. A total of 297 questionnaires were excluded from the analysis because the part concerning social value orientation was omitted, or because they contained a large number of missing data. Thus, the final sample size consisted of 1,209 participants.

2.2. Measures

The questionnaire consisted of six sections. In one section, subjects' social value orientation was assessed. Two further modules determined participants' energy conservation behavior based on curtailment and the respective motives underlying the behavior. Furthermore, modules followed where participants were asked about the implementation of energy efficiency behaviors and related motives. In a final section, subjects were requested to answer questions about socio-demographics. The complete questionnaire can be found in Appendix A.

Social value orientation

To assess subjects' social value orientation, a series of nine decomposed games (Messick & McClintock, 1968) were included. In each decomposed game participants were given three choice options, each corresponding to one of three social value orientations: prosocial, individualistic, and competitive. Based on subjects' choice tendency, social value orientation was identified. This measurement technique has proven to have good internal consistency (Liebrand & Van Run, 1985) and test-retest reliability (Kuhlman, Camac, & Cunha, 1986). Furthermore, due to its indirect nature, the measure is to a large extent free of tendencies toward social desirability (Platow, 1994). Given the nature of the decomposed game, the processes behind a subject's choice are somewhat unclear, and the possibility exists that it may share method variance with choices in social dilemmas. Therefore, the question about the validity of the classification of social value orientations arises. However, Gärling (1999) provided support for the validity by showing a relation between social value orientations and universalism values (e.g., equality, social justice, and solidarity). Prior to making choices, the decision situation was described. Participants were asked to imagine that they had been paired with another person they had never met in the past and would not possibly meet in the future. The description was followed by an example of a decomposed game to habituate subjects to the presented choice task. Furthermore, in order to emphasize the interdependence of choice, participants were informed that the final outcomes to them and the other person would depend on their own choice as well as on the choice of the other person. To elucidate the procedural method of the decomposed game technique as an instrument to assess social value orientation, it shall be explained on the basis of the following example. In one decomposed game, participants had to chose between three options: Option A, 480 for self and 80 for other; Option B, 540 for self and 280 for other; and Option C, 480 for self and 480 for other. In this case, Option A represented the competitive orientation, since this option provided the largest difference between one's own outcome and the outcome of the other person (480 – 80 = 400). Option B constituted the individualistic orientation, as the outcome for self (540) was the largest compared to the other options. The prosocial orientation was represented by Option C, since the sum of outcomes for self and other was the largest in this option (480 + 480 = 960) compared to A and B.

In line with the classification criteria used in previous studies, subjects were assigned to a particular social value orientation class if at least six choices were consistent with one of the three social value orientations (e.g., Joireman, et al., 2004). Proceeding in this way, 1,098 subjects (90.8%) out of 1,209 participants were classifiable: 851 prosocials (70.4%), 162 individualists (13.4%), and 85 competitors (7%). The remaining 111 participants (9.2%) failed to fulfill classification criteria, reducing the final sample size to 1,098 individuals. The percentages of people in the three social value orientation classes were similar to the ones found in previous studies (e.g., Van Vugt, et al., 1996).

However, most studies (Gärling, et al., 2003; Joireman, et al., 1997; Van Vugt, et al., 1995) combined individualists and competitors forming the social value orientation "proself". It was necessary to proceed in this way as these studies had small sample sizes, which resulted in a too small number of competitors. Moreover, from the point of view of these studies, there was no need to look at individualistic and competitive individuals individually, as these studies expected no difference between the two classes. We did not agree with this reasoning as the behavior of competitors and individualists is driven by a completely different motivation, which could be reflected in differences in energy conservation efforts. Competitors generally compare their performance with that of others, and this could also be true for energy conservation. Thus, competitors might show more conservation efforts than individualists. For this study, therefore, a sufficiently large sample size was chosen to guarantee a reasonable number of competitors, allowing a differentiation.

Energy conservation behavior based on curtailment

Energy conservation behavior based on curtailment was assessed within three different domains: housing, mobility, and food. Different behavioral patterns related to curtailment behavior were listed and participants were requested to indicate, on a 6-point Likert scale, how often they behave in the manner described by each item (for example, "buying seasonal food"). The scale included the following response options: 1 (*never*), 2 (*rarely*), 3 (*once in a while*), 4 (*often*), 5 (*almost always*), and 6 (*always*). Overall, the questionnaire contained fourteen items to assess energy conservation behavior based on curtailment: seven items were related to the housing domain; three items to the mobility domain; and four items to the food domain. The items constituting the three domains, including means and standard deviations, are depicted in Table 2.1. For each domain, the mean of the items was computed generating a curtailment behavior index for each energy consumption domain.

Motives underlying energy conservation behavior

Different items were used to assess participants' motives underlying their energy conservation behavior. The prosocial motive was measured using the following item: "I pay attention to energy consumption because I care for the future of the next generation." The individualistic motive was measured using three items related to the three energy consumption domains: "Energy conservation behavior in the housing domain entails too high losses of comfort," "Energy conservation behavior in the mobility domain entails too high losses of comfort," and "Energy conservation behavior in the food domain entails too high losses of comfort." Furthermore, the competitive motive was measured using the following item: "If I reduce my energy consumption, other people consume even more energy on more favorable terms." Participants were requested to indicate their agreement with the different statements concerning motives underlying energy conservation behavior on a 6-point Likert scale ranging from 1 (*I strongly disagree*) to 6 (*I strongly agree*). The three items underlying the individualistic motive "loss of comfort" were sufficiently related (alpha = .78). Thus, an index for the motive "loss of comfort" was built by computing the mean of the three items concerning "loss of comfort" in the respective energy consumption domain.

Energy efficiency behavior

In a further section, energy conservation behavior based on energy efficiency was investigated. The questionnaire included three items covering energy efficiency behavior related to the housing domain. Participants were presented with three statements: “In the purchase situation I pay attention to the energy consumption of electrical appliances,” “Water taps are equipped with a flow controller,” and “The shower is equipped with a water-conserving shower head.” The provided answer options were “yes” or “no”. An energy efficiency index was generated by counting the number of energy efficiency behaviors that were adopted by participants. The index ranged from 0, indicating that no energy efficiency behavior was pursued, to 3, denoting that all three behaviors mentioned had been pursued.

Table 2.1. **Items Used to Measure Energy Conservation Behavior Based on Curtailment Including Means and Standard Deviations and the Corresponding Energy Consumption Domains**

Domain/items	M	SD
Housing domain		
Turn down/off heating before leaving for holidays	4.95	1.56
Defrost freezer/chest freezer/freezing compartment	3.63	1.29
Wash laundry at lower temperatures (e.g., hot wash at 60 °C, lightly soiled laundry at 30 °C)	5.04	1.16
Turn off standby on appliances	4.31	1.55
Ventilate only briefly but thoroughly during winter	5.36	0.91
Adjust room temperature according to room’s usage, e.g., turn down temperature in unused rooms	5.09	1.17
Cook with pots covered	5.08	0.99
Cronbach’s α = .68[a]		
Mobility domain		
Go on holidays by train	2.53	1.37
Carpool if a distance is covered by car	2.82	1.47
Cover short distances (≤ 1 km) by bicycle or by foot	4.57	1.71
Cronbach’s α = .46[a]		
Food domain		
Buy regional foods	4.30	0.92
Buy seasonal fruits and vegetables	4.80	0.91
Avoid buying foods flown in	3.83	1.31
Avoid buying foods from distant countries	3.84	1.23
Cronbach’s α = .80		

Note. The scale ranges from 1 (*never*) to 6 (*always*). [a]Behavioral items are not expected to be highly correlated since they measure different energy conservation behaviors of differing levels of difficulty, therefore, alpha scores below .70 seem plausible.

Motives underlying adoption of energy efficiency behavior

The motives forming the basis of decisions in favor of energy efficiency were also assessed. One item was formulated to cover the cost motive: “When purchasing household appliances I pay attention to energy consumption due to running costs”. And one item reflected the motive energy consciousness: “When purchasing household appliances I pay attention to energy consumption due to energy consciousness”. Participants indicated on a 6-point scale, rang-

ing from 1 (*I strongly disagree*) to 6 (*I strongly agree*), how much the statements concerning the specific motives applied to them.

3. Results

3.1. Influence of Social Value Orientation Over Different Energy Consumption Domains

A 3 x 3 ANOVA was performed with the between-subject factor social value orientation (prosocials vs. individualists vs. competitors), the within-subject factor energy consumption domain (housing vs. mobility vs. food), and the frequency of energy conservation behavior based on curtailment as the dependent variable. Consistent with Hypothesis 1a, the analysis revealed a significant main effect for social value orientation, $F(2, 1095) = 18.39$, $p < .001$, $\eta_p^2 = .033$. This result suggests that social value orientation is a factor influencing energy conservation behavior based on curtailment. Furthermore, there was a significant main effect for the factor energy consumption domain, $F(2, 2190) = 382.75$, $p < .001$, $\eta_p^2 = .259$.[1] In line with Hypothesis 1b, the interaction between social value orientation and energy consumption domain was not significant, $F(4, 2190) = 1.24$, $p = .291$, indicating a consistent pattern of difference between the social value orientation classes over the three energy consumption domains (Figure 2.1). Results of simple main effect analyses for each energy consumption domain further supported Hypothesis 1b stating that social value orientation influences energy conservation behavior based on curtailment in various energy consumption domains. Social value orientation was found to be significant for the domains housing ($F(2, 1095) = 11.05$, $p < .001$), mobility ($F(2, 1095) = 11.46$, $p < .001$), and food ($F(2, 1095) = 7.99$, $p < .001$). Furthermore, in line with Hypothesis 1a, planned contrasts (one-tailed p-values are presented) revealed that prosocials reported significantly more curtailment behavior ($M = 4.23$, $SD = 0.02$) than competitors ($M = 4.04$, $SD = 0.07$), $t(1095) = 2.39$, $p = .008$, and individualists ($M = 3.89$, $SD = 0.05$), $t(1095) = 5.82$, $p < .001$. The difference between individualistic and competitive subjects was also significant, $t(1095) = 1.69$, $p = .045$.

3.2. Motives Underlying Energy Conservation Behavior

Hypothesis 1c stating that the characteristics of the three social value orientation classes are reflected in the different motives that underlie behavior related to energy conservation was examined performing one-way ANOVAs, with social value orientation as the independent variable and the specific motives as the dependent variable. For the three motives significant effects of social value orientation emerged. All effects were in line with Hypothesis 1c (Table 2.2). Planned contrast showed that prosocials rated the conservation motive concerning the future of the next generation significantly higher than the two other value orientation classes – competitors and individualists – combined, $t(1090) = 3.55$, $p < .001$ (one-tailed). Furthermore, consistent with Hypothesis 1c, a planned contrast revealed that individualists significantly more perceived energy conservation as entailing too high losses of comfort than the two other value orientation classes – prosocials and competitors – combined, $t(1093) = 2.33$, $p = .010$ (one-tailed). Finally, supporting Hypothesis 1c, a further planned contrast showed that the belief that others take advantage of one's conservation efforts was a significantly

[1] Results on the main effect of consumption domain indicating that energy conservation behavior based on curtailment differs depending on energy consumption domain, i.e., mobility-related behaviors are least frequently performed, are in line with findings of other studies (e.g., Poortinga, et al., 2003). However, the behavior items used to measure energy conservation behavior differ in difficulty since they vary in demand on individual abilities and resources. As it does not emanate from the findings whether the main effect is due to the differences in difficulty of the items underlying the specific consumption domain indices or the difference in energy consumption domain per se, the main effect of energy consumption domain should be interpreted with caution, and hence is not discussed further.

more pronounced motive for competitors than for the other two value orientation classes – individualists and prosocials – combined, $t(1089) = 1.88$, $p = .030$ (one-tailed).

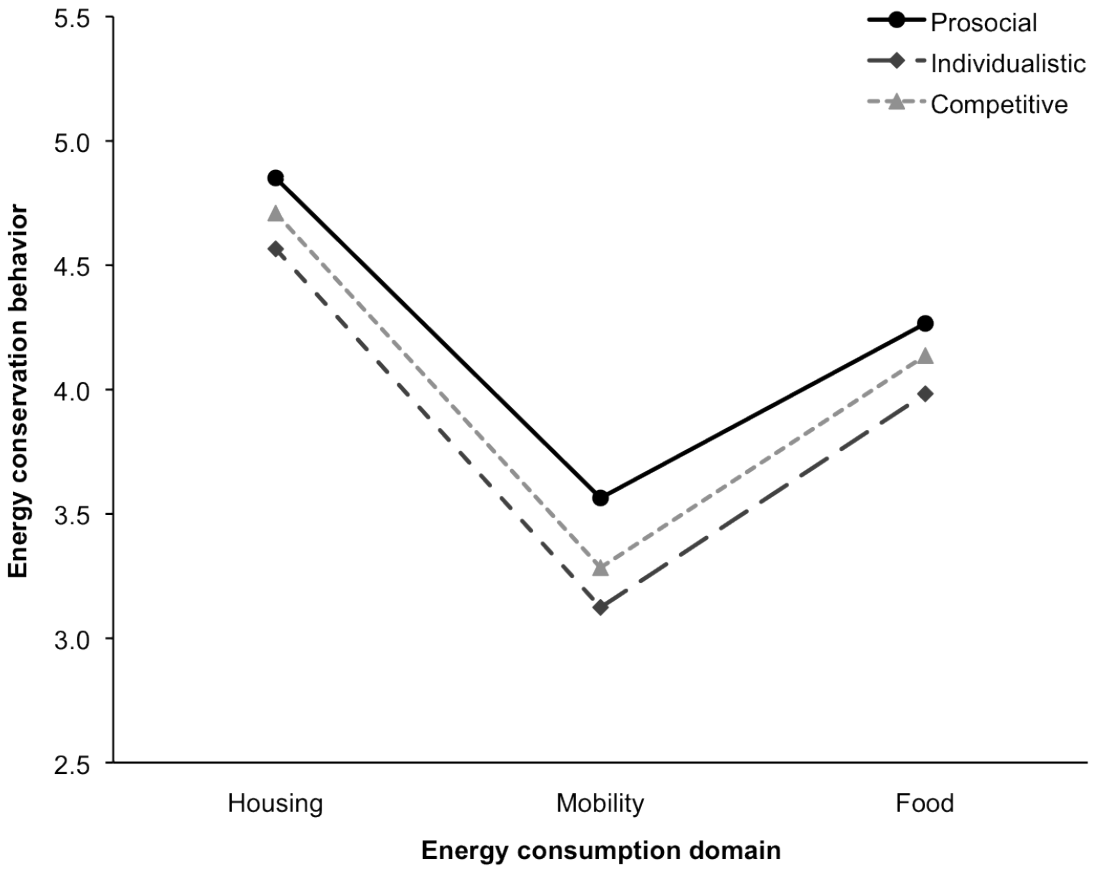


Figure 2.1. **Frequency of energy conservation behavior based on curtailment as a function of social value orientation and energy consumption domain. Frequency of energy conservation behavior ranges from 1 (*never*) to 6 (*always*).**

Table 2.2. **Motives and Barriers for Energy Conservation Behaviors of the Three Social Value Orientations (Prosocial, Competitor, Individualist) Including Means and Standard Deviations and Results of Analyses of Variance**

	Prosocial		Competitor		Individualist		
Conservation motives / barriers	M	SD	M	SD	M	SD	ANOVA results
Future of next generation[a]	5.20	1.04	4.98	1.20	4.85	1.13	$F(2, 1090) = 8.18$, $p < .001$, $\eta_p^2 = .015$
Loss of comfort[b]	2.47	1.08	2.73	1.16	2.85	1.07	$F(2, 1093) = 9.38$, $p < .001$, $\eta_p^2 = .017$
Others profit from one's efforts[c]	2.55	1.46	3.01	1.70	2.83	1.46	$F(2, 1089) = 5.43$, $p = .005$, $\eta_p^2 = .010$

Note. [a]$N = 1093$. [b]$N = 1096$. [c]$N = 1092$.

3.3. Social Value Orientation and Type of Energy Conservation Measure in the Housing Domain

Hypothesis 2a stated that differences in energy conservation behavior between social value orientation classes depend on the type of energy conservation measure (curtailment versus energy efficiency). The two indices measuring curtailment and energy efficiency behavior in the housing domain had different scale ranges. Thus, separate z scores were calculated to standardize the two scores. A 3 x 2 ANOVA was performed, including social value orientation as a between-subject factor and type of energy conservation measure as a within-subject factor. The analysis yielded a significant main effect of social value orientation, $F(2, 1087) = 8.85$, $p < .001$, $\eta_p^2 = .016$. There was no main effect of type of energy conservation measure, $F(1, 1087) = 0.92$, $p = .337$. Contrary to Hypothesis 2a, the interaction between social value orientation and type of energy conservation measure failed to reach significance, $F(2, 1087) = 1.83$, $p = .160$. However, in line with our expectations, simple main effect analyses revealed a significant effect of social value orientation on energy conservation behavior based on curtailment, $F(2, 1087) = 10.26$, $p < .001$, but a non-significant effect on energy conservation behavior based on energy efficiency, $F(2, 1087) = 2.48$, $p = .084$. The effect of social value orientation and type of energy conservation measure on energy conservation behavior is depicted in Figure 2.2.

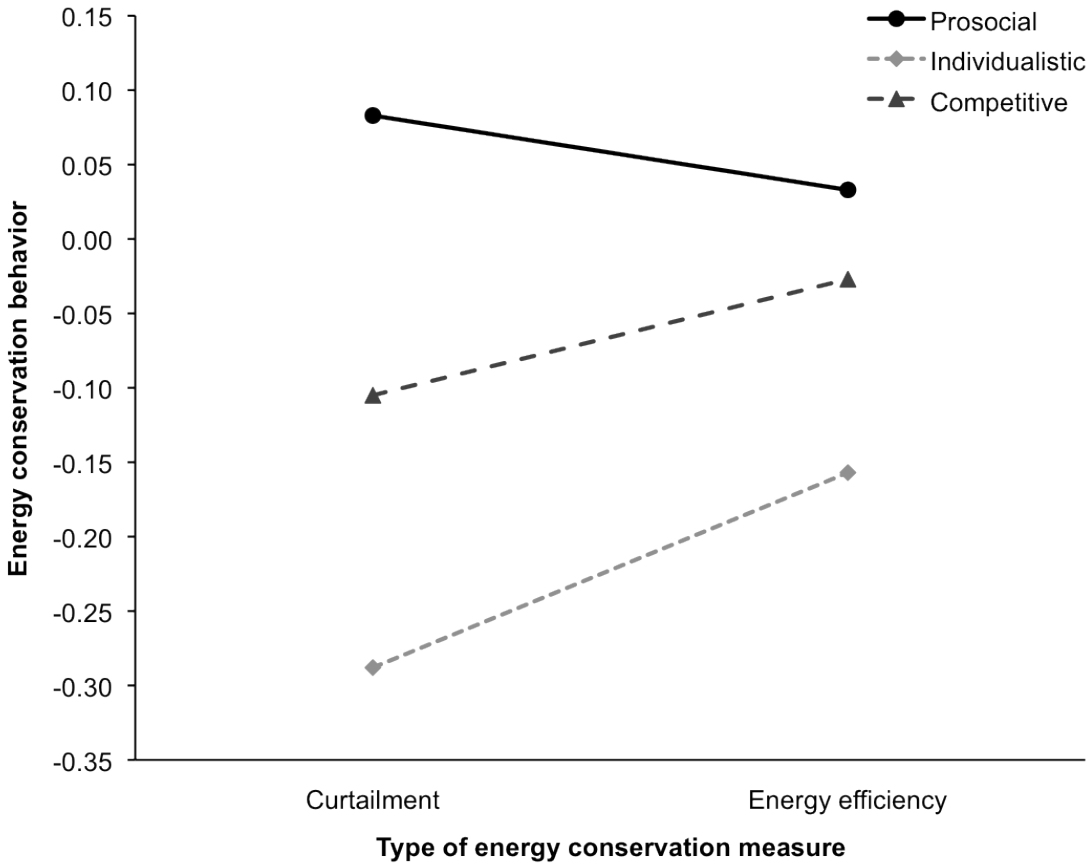


Figure 2.2. **Energy conservation behavior in the housing domain as a function of social value orientation and type of energy conservation measure "curtailment behavior" vs. "energy efficiency behavior" (standardized values of energy conservation behavior are depicted).**

3.4. Motives Underlying Adoption of Energy Efficiency Behavior

As previously reported based on the findings from simple main effect analysis of type of energy conservation measure, there was no difference between social value orientation classes

regarding adoption of energy efficiency behavior in the housing domain. However, the underlying motives were expected to differ (Hypothesis 2b). In order to have a direct comparison of the importance assigned to the motive running costs and to the motive energy consciousness, an index was generated by subtracting an individual's rating of the motive running costs from the rating of the motive energy consciousness: the more positive the values, the more important the motive energy consciousness, and the more negative the values, the more important the motive running costs. An analysis of variance showed a significant effect of social value orientation, $F(2, 1082) = 7.84$, $p < .001$, $\eta_p^2 = .014$. As expected, planned contrasts (one-tailed p-values are presented) showed that energy efficiency behaviors of prosocials were significantly more motivated by energy consciousness ($M = 0.42$, $SD = 1.39$) than energy efficiency behaviors of individualists ($M = 0.02$, $SD = 1.36$), $t(1082) = 3.27$, $p < .001$, and of competitors ($M = 0.00$, $SD = 1.46$), $t(1082) = 2.62$, $p = .004$.

4. Discussion

The present study examined the influence of social value orientation on self-reported energy conservation based on curtailment behavior in various energy consumption domains. As hypothesized, the results showed a relation between social value orientation and energy conservation behavior in the housing, mobility, and food domain. In each household domain, prosocial individuals exhibited more curtailment behavior than individualistic and competitive individuals. Moreover, participants' social value orientation was reflected in the specific motives related to their energy conservation behavior. Energy conservation behavior of prosocial individuals was associated with concerns regarding the future of the next generation, as their focus was mainly on collective wellbeing. Individualistic and competitive individuals were less likely to show increased energy conservation behavior, which is possibly related to their primarily self-interested motives. Individualists rated loss of comfort highest as a barrier to behaving in an energy-conserving way, whereas competitors tended to give more consideration to the concern that other people would benefit from the situation and would consume more energy on cheaper terms.

The study demonstrates external validity of social value orientation in predicting self-reported energy conservation behavior. The effect of social value orientation on intended proenvironmental behavior has been shown in studies using laboratory settings (Kramer, et al., 1986; Van Vugt, et al., 1995) or hypothetical scenarios (Van Vugt, et al., 1996). These studies did not examine daily decision-making situations, but participants' decisions in artificial situations. Studies examining self-reported proenvironmental behavior in everyday life failed to show differences among the three social value orientation classes (e.g., Cameron, et al., 1998). To the best of our knowledge, the present study is the first one that shows a general effect of social value orientation on self-reported energy conservation behavior. This effect was found across the three energy consumption domains: housing, mobility, and food. Furthermore, the measurement of energy conservation behavior related to mobility used in the present study was less susceptible to other influencing factors that restrict the scope of action of consumers. Previous studies have focused on people's commuting preferences, which, besides personality characteristics, are also strongly influenced by situational and structural constraints such as the accessibility of public transportation, scarcity of parking space, or susceptibility to traffic jams (Joireman, et al., 2004; Van Vugt, et al., 1995; Van Vugt, et al., 1996). In addition, individuals might choose public transportation driven by self-interested rather than prosocial motives. They might, for example, prefer public transportation since they perceive it as less stressful, or because they enjoy conversation with other people. In the present study, we assessed mobility behavior in a more general way, independent of a person's access to a car. This is possibly one reason for which we could show a general impact of social value orientation on energy conservation behavior related to mobility that was not found in other studies.

The general effect of social value orientation found in this study seems to be small. However, given that previous studies failed to demonstrate a general effect of social value orientation on self-reported energy conservation behavior, the insights of the present study are of considerable importance since this study shows that there is actually an effect of social value orientation on energy conservation behavior, but that it is rather small. Furthermore, considering the fact that individuals are classified using the decomposed game technique, even a small effect is important, since the prediction of energy conservation behavior based on preferences concerning monetary outcome allocations is of a rather indirect nature. Finally, the predominant number of prosocial participants, compared to individualistic and competitive participants, leads one to suspect that a self-selection bias exists. This assumption finds support in a previous study by McClintock and Allison (1989) and a recent study by Van Lange, Schippers, and Balliet (2011) showing that prosocial people are more inclined to participate in experiments than individualistic and competitive individuals. As a result, the effect of social value orientation on energy conservation behavior may have been underestimated, because individualists and competitors are less willing to participate in survey research.

A rather surprising finding of the study is that competitors showed consistently, over different domains and types of conservation measures, more energy conservation behavior than individualists. A recent study on donations, which was conducted by Van Lange, Bekkers, Schuyt, and Van Vugt (2007), partly showed the same tendency. For some categories of organizations, they found higher values for donations of competitive individuals than of individualistic individuals. A possible explanation for the higher engagement in energy conservation behaviors of competitors could be that they generally perceive energy conservation as a competition. They could, for example, strive to profit more from financial advantages compared to others, or know more about energy conservation behavior and do a better job of putting this knowledge into action. Furthermore, research on competitive altruism suggests that energy conservation behavior can also be driven by reputational concerns since an altruistic reputation brings benefits; for example, being more likely to be selected as a group leader (for an overview, see Van Vugt, et al., 2007). Therefore, competitors' conservation attempts may well be motivated by the desire to obtain a certain status.

Another purpose of the study was to demonstrate that the type of energy conservation measure constitutes a crucial factor moderating the differences in energy conservation behavior between social value orientation classes in the housing domain. Although the expected interaction did not reach significance, results pointed in the expected direction. Contrary to behavioral measures based on curtailment, no difference emerged between social value orientation classes regarding the adoption of energy efficiency behaviors. However, the underlying motives were different: individualists and competitors were more driven by financial benefits than prosocials, whereas prosocial individuals were more motivated by energy consciousness than the other two social value orientation classes. This finding indicates that self-interest and energy conservation behavior are not, in principle, mutually exclusive (De Young, 2000) as long as there exists no conflict with other crucial self-interests, such as maintenance of comfort (Gatersleben, 2001). As energy efficiency behaviors meet these requirements, they provide a suitable behavioral measure for self-interested individuals.

The current study supports the notion that people solve daily decisions related to energy consumption, which can also be perceived as social dilemmas, depending on their social value orientations by focusing more on collective interest or on self-interest. Differences between the social value orientation classes are consistent over all domains. This implies that efforts addressing the specific motives of a social value orientation class, and aiming to advocate energy conservation behavior, need no differentiation across domains. Consumers' interests and motives do not change depending on the specific consumption domain. Findings on the moderating influence of type of energy conservation measure further emphasize the issue that self-interest can be considered as a chance, or as De Young (2000) stated, as a "potential solution to environmental problems" (p. 514). When energy conservation measures are communicated, for example, as an economic gain, or as implying a certain status (Griskevicius, et al., 2010), while, at the same time, the small personal efforts related

to it are highlighted, energy conservation behavior of individualists and competitors could be increased. These issues should especially be taken into consideration when it comes to the development of educational material. Energy conservation could be additionally fostered by providing financial incentives in terms of subsidies, price reductions, or rewards, which, primarily for individualists, constitute a motivation to show more conservation behavior. Considering the driving force of status motives, communication campaigns linking energy conservation behavior to status and prestige, for example, by running commercials with celebrities, bear great potential to promote individualists' and competitors' conservation behavior. This might especially hold true for energy conservation behaviors that are clearly visible to others, such as driving an energy-efficient car.

There are also some limitations of the present study that need to be addressed. As it is generally the case in research relying on self-reports when measuring behavior, our study is susceptible to the social desirability response bias. This bias describes the tendency of individuals to respond in a way they consider to be socially desirable (Randall & Fernandes, 1991). This leads to a denial or mitigation of socially undesirable behaviors and personality traits, and an overstatement of socially desirable ones. However, as participants assigned to the three social value orientation classes are expected to be equally likely to respond in a socially desirable way, differences between the classes are assumed to be unaffected by the bias. The only possibility to investigate real life energy conservation behavior that is largely unsusceptible to the social desirability bias is by observing participants in their natural environment. However, the knowledge of being observed could also lead participants to behave in a socially desirable way, at least at the beginning of the observation period until they get accustomed.

A further issue that probably gives rise to discussion is the low reliability of the mobility index. Considering the low reliability score, it might be argued that the different mobility items do not essentially measure the same and should not be combined. However, according to measurement theory, energy conservation behavior is conceived as a formative construct (Jarvis, MacKenzie, & Podsakoff, 2003). That is, changes in the measures are assumed to cause changes in the underlying construct since they are all defining characteristics. These measures do not necessarily assess identical aspects of the construct's domain and do not need to be highly correlated. Consequently, operationalizing energy conservation behavior as a behavior index computed as the mean of behavioral items that differ in difficulty and demand, even though they are not highly correlated, is perfectly justified. Nevertheless, considering the range of conservation behaviors related to specific consumption domains, it seems preferable to formulate more than just three behavioral items to capture energy conservation behavior of a domain in a more comprehensive way, and, thus, assure high construct validity.

Who Puts the Most Energy into Energy Conservation? A Segmentation of Energy Consumers based on Energy-Related Behavioral Characteristics

1. Introduction

Young, female, well-educated, and wealthy: that is how the energy saver could be described, at least based on the findings of some studies (e.g., Dillman, et al., 1983; Long, 1993; Morrison & Gladhart, 1976; Olli, et al., 2001; Olsen, 1983; Roberts, 1996; Sardianou, 2007; Walsh, 1989). Consequently, this information could possibly provide the basis for the development of communication strategies aiming to motivate energy consumers to increase their conservation efforts. But, is it really that simple? Are the characteristics of an energy saver that obvious and, accordingly, are the different types of energy consumers that easily identified and described? The contrasting results of studies trying to define and describe different energy consumers based on sociodemographic characteristics suggest that this is apparently not the case (for a review, see Diamantopoulos, et al., 2003). The factors and processes underlying energy consumption behavior are much more complex and far-reaching.

Averaged worldwide, the residential sector accounts for approximately 30% of the energy consumed by all sectors (Swan & Ugursal, 2009). Accordingly, the household sector has considerable energy conservation potential and is a worthwhile focus of future attempts aimed at decreasing energy consumption. However, a prerequisite for the development of effective, targeted communication strategies and marketing instruments is to carefully identify and describe the different energy consumer types and, subsequently, to focus on the most important ones, that is, consumer segments that are of significant size and offer promising starting points for interventions. The central question with regard to the development of tailored intervention strategies is whether there exist different types of energy consumers that can be distinguished according to their energy-saving efforts in general and according to the kind of energy-saving measures they are likely to adopt. Thus, consumers' effective behavior and attitudes related to energy consumption provide a more suitable information base for the development of energy conservation strategies and policy making than information about general consumer characteristics, such as values and sociodemographics (Schlegelmilch, Bohlen, & Diamantopoulos, 1996). The aim of this study is to identify different energy consumer segments based on their energy-related behaviors and energy-related psychosocial factors in order to highlight the characteristics of the most promising segments and, subsequently, to elaborate on possible tailored energy conservation strategies and policies. In contrast to the few already existing energy consumer segmentation studies, the present study applied a more comprehensive and differentiated approach with regard to the behavioral characteristics that were used as a basis for identification of different energy consumer segments.

1.1. Profiling the Energy-Saving Consumer

Pursuing the goal to develop energy conservation campaigns that are specifically designed to meet the needs, desires, and interests of the different types of energy consumers, various attempts have been made to profile the proenvironmental consumer over the past few years (Davis & Rubin, 1983; Egmond, et al., 2006; E. M. Rogers, 1995; Smeesters, et al., 2001). Generally, two approaches used to profile the proenvironmental consumer can be distinguished: profiling methods based on sociodemographic criteria and methods based on psychographic and behavioral criteria. Sociodemographics were found to explain only a small part of variance regarding proenvironmental behavior (Diamantopoulos, et al., 2003), and also proved to be less suitable in predicting energy-saving behavior than attitudinal and behavioral variables (Diaz-Rainey & Ashton, 2010; Rowlands, et al., 2003). Therefore, sociodemographics seem less appropriate to serve as a base for the profiling of energy consum-

ers, but are of more use in describing the already identified segments in a second step (Rossiter & Percy, 1987). Moreover, sociodemographics as well as personality characteristics (e.g., values, lifestyle) represent general characteristics that are independent of energy conservation issues as they influence general behavioral patterns rather than specifically energy-related behavior (Eimers & Pieters, 2002); thereby, they indirectly also affect energy consumption. Consequently, the effects of such 'distant' variables are already represented in energy-saving behavior and attitudes related to energy-saving behavior (Rossiter & Percy, 1987).

Segmentation studies aiming to identify the different types of energy consumers by applying a cluster analytic approach are largely lacking. An exception constitutes the energy consumer segmentation study of Prose and Wortmann (1991) and Wortmann and colleagues (1996) conducted in Germany. They used general values, lifestyle, and general patterns of consumer behavior as the segmentation base. Other researchers used in their studies on environmental issues attitudes (Vicente & Reis, 2007) and behavior (Roberts, 1995) as a segmentation base. In a cluster analytic approach, the selection of the segmentation variables is crucial for the subsequently emerging consumer clusters.

As the purpose of the present study is to serve as a basis for the development of marketing strategies and as we are especially interested whether consumers differ in the extent to which and the area in which they show a specific behavior, energy-saving behavior and energy-related attitudes were chosen as a basis for the classification of the energy consumers (Rossiter & Percy, 1987). This approach has also been applied by segmentation studies investigating proenvironmental behavior in general. But these studies either did not distinguish between the different types of proenvironmental behavior (e.g., do Paco & Raposo, 2009) or only in a less distinctive or incomplete way (Barr, et al., 2005; Gilg, et al., 2005; Jansson, et al., 2009). A differentiation of the various types of environmentally significant behavior is provided in the following section.

1.2. Energy-Saving Behavior

Energy is omnipresent in consumers' everyday lives, and a multitude of decisions that consumers make are directly or indirectly related to energy consumption. Since energy is involved in various daily actions and decisions, energy-saving behavior can be expressed in different ways. Two types of energy-saving behaviors that are generally distinguished are energy-saving actions based on curtailment and actions based on the adoption of energy efficient technologies (Samuelson, 1990; Stern & Gardner, 1981). The term curtailment refers to energy-saving actions that have to be performed repeatedly and that are associated with a change in a consumer's everyday life since they require the adoption of new energy use habits (Aarts & Dijksterhuis, 2000; Marechal, 2009) and adjustments in lifestyle (Schipper, et al., 1989). Examples of curtailment actions are reducing the temperature in unused rooms, buying seasonal food, or carpooling. Energy-saving behavior based on energy efficiency measures, on the other hand, requires only one single action, such as the purchase of an energy efficient appliance, that has a long-term effect on the energy consumed and does not require a change in everyday energy use behavior because it represents a "one-shot" behavior that does not require frequent repetition (Stern & Gardner, 1981). Even though energy efficient measures imply an initial investment, they often pay out in the long run.

The two types of energy-saving actions are psychologically different (Gardner & Stern, 2002; Stern & Gardner, 1981). While technical solutions offer the same benefits in a less energy-consuming way, curtailment behavior reduces benefits since consumers have to decrease their use of existing energy systems. These qualitative differences between the two types of energy-saving actions are reflected in consumers' acceptance of the specific energy-saving measures. Individuals are more receptive to energy-saving measures based on energy effi-

ciency than on curtailment (Poortinga, et al., 2003; Steg, et al., 2006). Furthermore, a recent study provided evidence that the type of energy-saving measure has a moderating impact on the differences in energy-saving efforts between consumers with different social value orientations (Sütterlin, Brunner, & Siegrist, 2013). While prosocial individuals exhibited more energy-saving behavior based on curtailment than individualistic and competitive individuals, these three social value orientation classes showed equal energy-saving efforts based on energy efficiency. These findings emphasize the importance of a separate consideration of curtailment and energy efficiency behaviors when trying to identify the different types of energy consumers.

Research is largely lacking that profiles energy consumers and differentiates between these two types of energy-saving behavior. The few segmentation studies on proenvironmental behavior that have taken this aspect into consideration distinguished between purchase-related behavior and curtailment behavior (e.g., Barr, et al., 2005; Jansson, et al., 2009). In these studies, purchase-related behavior included not just energy efficient appliances, but also the purchase of environmentally friendly or organically produced products, such as detergents and food. These two purchase-related behaviors are considered the same type of energy-saving behavior. However, we suggest that purchase-related behavior such as buying food differs from energy efficiency behavior. Consumers face many more situations related to the purchase of environmentally friendly daily food or non-food products than situations related to the purchase of energy efficient appliances. Consequently, it is likely that consumers develop habits with regard to the purchase of daily food and non-food products and that a change in these purchasing behaviors requires more restrictions in lifestyle and quality of life than energy efficiency measures. Providing support for this assumption, a study by Poortinga and colleagues (2003) revealed that consumers perceive changes in consumption (e.g., alteration of food pattern, not buying greenhouse vegetables) as less acceptable than technical measures. Therefore, in the current study, energy efficient behavior was considered separately from the purchasing behavior of daily products, as this distinction allows a much clearer differentiation from curtailment behavior, which is more influenced by habits and affects one's current lifestyle.

Consumers can also indirectly contribute to energy-saving by supporting or accepting energy policies, e.g. stated approval of regulations or willingness to pay higher taxes (Stern, 2000). Although consumers may only indirectly contribute to the improvement of the energy situation by accepting energy policies, this behavior has substantial potential since many energy consumers are reached at the same time by public policies that can consequently change people's energy consumption, e.g. pricing policies such as increasing energy taxes. Besides the specific features of energy policies, such as incentive versus disincentive measures, or energy efficiency versus curtailment (e.g., Steg, et al., 2006), consumers' acceptance of policy measures is also dependent on individual factors. For example, in a recent study, Steg and colleagues (2005) showed that values influence awareness of problems related to energy and the ascription of individual responsibility to these problems, which in turn have an impact on the perceived moral obligation to take corrective actions, finally resulting in increased acceptability of energy policies.

1.3. Determinants of Energy-Saving Behavior

Stern (2000) divides the various determinants of environmentally significant behavior (for an overview, see Faiers, Cook, & Neame, 2007; Wilson & Dowlatabadi, 2007) into four major categories: attitudinal factors (values, beliefs, and norms), personal capabilities (e.g., age or income), habits or routines, and contextual forces (e.g., community expectations or government regulations). Since this study focuses mainly on determinants of the categories "attitudinal factors" (hereinafter referred to as "psychosocial factors") and "personal capabilities," in the following, only these two categories will be described in greater detail. Contextual forces are only indirectly addressed through consumers' beliefs or perceptions related to contextual forces (e.g. social norms are reflected in individuals' perceived social pressure to conserve).

Psychosocial factors

This category includes values, beliefs, and norms (Stern, 2000), which are frequently investigated using the theoretical framework of the value-belief-norm theory (VBN) postulated by Stern (2000). VBN theory is based on the assumption that values drive behavior by activating beliefs about human-environmental relations, their consequences (i.e. awareness of consequences), and the individual's responsibility (i.e. ascription of responsibility) to take appropriate actions. This results in a moral obligation (i.e. personal norms), to behave in an environmentally friendly manner. Besides general environmental issues (e.g., Kaiser, et al., 2005), VBN theory has also been applied in energy-related contexts for the prediction of consumers' acceptability of energy policies (Steg, et al., 2005) and household energy use (Poortinga, Steg, & Vlek, 2004).

There are also other important energy-related, or environmentally related, psychosocial factors that exert an influence on proenvironmental behavior. Individuals may hold positive attitudes toward proenvironmental behavior; however, these attitudes will not result in proenvironmental behavior if people do not believe that their efforts can actually produce the desired effect. Thus, people's beliefs about the efficacy of a particular action, such as perceived response efficacy and self-efficacy, are decisive for the decision to engage in proenvironmental behavior. Perceived response efficacy refers to a person's belief that a particular action or measure will be successful in achieving a certain outcome, e.g. amelioration of the energy situation. Martens and Rost (1998) who applied a multivariate approach to explain different proenvironmental behaviors, provided evidence that a higher intention to perform an environmental friendly behavior is associated with a higher perceived response efficacy. Perceived self-efficacy, on the other hand, describes an individual's belief that he/she has the ability to engage in a particular behavior. The importance of the perceived self-efficacy has been demonstrated in several studies (e.g. Axelrod & Lehman, 1993; Lindsay & Strathman, 1997). Furthermore, various studies provided evidence that a consumer's belief that his/her own efforts are effective and can make a difference, i.e. perceived personal efficacy (or perceived consumer effectiveness), is also a driving force behind proenvironmental behavior (Gilg, et al., 2005; Roberts, 1996; Straughan & Roberts, 1999). Their findings show that individuals demonstrate more proenvironmental actions if they believe that their individual behavior is effective in combating environmental problems.

Considerations related to personal comfort or convenience (Samuelson & Biek, 1991) also play an important role when it comes to proenvironmental behavior. As stated by Gatersleben (2001), consumers consider energy savings acceptable as long as they do not conflict with any utility derived from consumption, i.e. comfort. Furthermore, Barr and colleagues (2005) found in a segmentation study that individuals showing the least conserving actions were less willing to sacrifice comfort to save energy than individuals engaging in more energy-saving efforts.

Finally, social norms (Goldstein, et al., 2008; Thogersen, 2008), reflected in perceived social pressure (Schwartz, 1977) to save energy, can also motivate an individual to behave in an environmental friendly manner. In a recent study, Thogersen and Gronhoj (2010) included subjective social norms (i.e., perceived social pressure) in a conceptual framework for understanding energy-saving behavior. The findings provide evidence that subjective social norms have an effect on energy conservation intentions.

Personal capabilities

This category subsumes all the capabilities required by a consumer to perform a particular behavior, including knowledge and skills for the specific action, the availability of time, and general capabilities and resources such as literacy, money, social status, and power (Stern, 2000). As sociodemographic variables define, to a certain extent, consumers' scope of action, they are proxies for personal capabilities.

The aim of this study is to identify different energy consumer segments using a comprehensive approach including three psychologically different energy-saving behaviors – curtailment, energy efficiency, and acceptance of policy measures – as the segmentation base, together with energy-related psychosocial variables. Concerning the definition of the segmentation base, behavior and behavior-related variables were favored over sociodemographics and personality characteristics.

2. Methods

2.1. Participants and Procedure

A mail-in survey was sent out to a random sample of Swiss households, drawn from the telephone directory. About one-third of the questionnaires were mailed to the French-speaking part of Switzerland and about two-thirds to the German-speaking part. The questionnaire was accompanied by a cover letter describing the aim of the study and ensuring absolute anonymity. Attempting to quasi-randomly assign questionnaires within households, the next-birthday method was applied; the member of the household who was aged 18 or older and who would have the next birthday was asked to fill in the questionnaire. Data collection took place from mid-November, 2009 to the end of January, 2010. A total of 179 questionnaires were undeliverable because the address was no longer valid due to relocation or death of the addressee. A further 73 questionnaires could not be filled in due to advanced age or because recipients were not sufficiently proficient in the language in which the questionnaire was written. By the end of the data collection period, 1,506 questionnaires were returned, which corresponded to an adjusted response rate of 43.3%. Due to missing values, a total of 214 questionnaires had to be excluded from the analysis, resulting in a final sample size of 1,292 participants.[2] Subjects were excluded if one or more of the underlying scales that were used to generate the variables constituting the segmentation base had more than 50% missing values.

The sample consisted of 60.2% men, and the average age was 52.4 years (*SD* = 15.40). Respondents ranged in age from 18 to 93. The gender distribution and average age of the sample slightly differed from the Swiss population, since women constitute 50.8% of the Swiss population and the average age of adult citizens is approximately 48 years (BFS, 2009).

2.2. Measures

To gain a first insight into consumers' way of thinking that guides behavior in energy-related issues and to generate further ideas for the following survey, two focus groups were conducted, each consisting of seven subjects. Afterwards, the questionnaire for the survey was developed containing seven sections. In a first part, participants' energy-saving efforts were assessed. Subsequently, a module followed to determine the motives underlying energy-saving behavior. In a next section, subjects' acceptance of different policy measures was assessed. Furthermore, different energy-related beliefs were measured, including response efficacy, self-efficacy, perceived personal efficacy, awareness of consequences, ascription of responsibility, and personal norms. A further module with various questions measuring subjects' general energy-related attitudes followed. In addition, a module was included assessing participants' energy knowledge. In a final section, subjects were requested to answer questions about sociodemographics. The complete questionnaire is provided in Appendix A.

[2] A comparison of the excluded subjects with the final sample revealed several significant differences on sociodemographic characteristics: Gender, $\chi^2(1, N = 1467) = 15.12$, $p < .001$; age, $t(1460) = 6.63$, $p < .001$; education, $t(1462) = 7.17$, $p < .001$. Therefore, some caution is advised when generalizing the findings.

Energy-saving behavior

Energy-saving efforts based on curtailment measures and based on energy efficiency measures were assessed. In addition, the specific underlying motives were measured.

Energy-saving behavior based on curtailment

Energy-saving efforts based on curtailment behavior were assessed within three different domains: housing, mobility, and food. Different activities related to energy-saving behavior were listed and participants were asked to indicate, on a six-point Likert scale, how often they perform the described energy-related activity; for example, "buy seasonal fruits and vegetables." The scale included the following response options: 1 (*never*), 2 (*rarely*), 3 (*once in a while*), 4 (*often*), 5 (*almost always*), and 6 (*always*). When participants were unable to answer a question, they had the possibility of choosing the response option "does not apply to me." Overall, the questionnaire consisted of 20 items to assess energy-saving efforts based on curtailment behavior; 12 items related to the housing domain; four items related to the mobility domain; and four items related to the food domain. Items were generated based on available guides on how to save energy in the household. The items constituting the three domains, including means and standard deviations, are presented in Table 3.1.[3]

As research suggests that consumers' acceptance of saving measures varies depending on the respective consumption domain (Pedersen, 2000; Poortinga, et al., 2003), and as an aim of the study was to distinguish between saving actions related to the purchase of daily products (in this case food) and related to energy efficiency, the three energy consumption domains were separately considered. For each domain an energy-saving index was generated computing the mean of the underlying items.

Energy-saving actions based on energy efficiency measures in the housing domain

Energy-saving behavior based on the adoption of energy efficiency measures (i.e. energy-saving purchase decisions regarding energy efficiency) was investigated. Three items assessing energy-saving purchasing behavior related to the housing domain were included. The items used to measure energy efficiency in the housing domain are depicted in Table 3.1. Participants were requested to indicate whether they adopted or engaged in the energy efficient behaviors by choosing the answer options "yes" or "no." The three items assessing energy efficiency measures were drawn from available guides on how to save energy in the household. To assure that the segmentation study represents the whole population, only items were selected that do not presuppose any ownership, e.g. to be house owner, and could be answered by all participants. An energy efficiency index was created by counting the number of energy efficient measures adopted by participants. The index ranged from 0, signifying that no energy efficiency measure has been implemented, to 3, denoting that all three measures mentioned have been pursued.

[3] Some behavioral items are vaguely formulated and, therefore, bear the risk of being ambiguously interpreted by subjects; this, in turn, could result in a certain distortion of the findings. Due to their vague wording, items that provide the most cause for concern in this regard include "defrost freezer/chest freezer/freezing compartment," "ventilate only briefly, but intensively during winter," and "take a long shower." As the formulation does not clearly indicate which duration or time interval of the respective behavior is considered energy-friendly, these items are open to the subject's interpretation and, consequently, might be perceived quite differently. In order to rule out the concern that vaguely formulated items distort the results, we conducted a further cluster analysis in which the arguable items were omitted. In other words, a behavioral index of curtailment behaviors in the housing domain was constructed without these items and was subjected to cluster analysis. The emerging clusters were comparable to the ones identified in the former cluster analysis using the behavioral index that included all items. The general pattern of difference among clusters persisted, and the main characteristics of the individual clusters remained the same. Consequently, the items were not excluded from analyses because no evidence for a distortion of the findings exists and because they still provide interesting descriptive information for the energy consumer types. However, necessary caution must be exercised when interpreting these items.

Financial and energy consciousness motive

Energy-saving behavior is driven by different motives depending on the type of energy consumer. Energy consciousness or more self-interested financial considerations might underlie energy-saving efforts. To cover the financial motive, two items were formulated. Furthermore, three items were included that reflected the motive energy consciousness. The items and the corresponding means and standard deviations are listed in Table 3.1. Participants indicated on a six-point scale, ranging from 1 (*applies not at all*) to 6 (*completely applies*), how much the statements concerning the specific motives applied to them. Cronbach's alpha was .79 for both, the financial motive and the motive energy consciousness. For each motive, the mean of the underlying items was computed.

Table 3.1. **Items Used to Measure Energy-Saving Behavior and Motives Including Means and Standard Deviations**

Items	M	SD
Curtailment behavior in the housing domain[a]		
Fill washing machine to capacity	5.09	0.91
Turn down/off heating before leaving for holidays	4.94	1.52
Defrost freezer/chest freezer/freezing compartment	3.63	1.23
Wash laundry at lower temperatures (e.g., hot wash at 60 °C, lightly soiled laundry at 30 °C)	5.02	1.14
Turn off standby on appliances	4.29	1.59
Ventilate only briefly, but intensively during winter	5.37	0.90
Adjust room temperature according to room's usage, e.g., turn down temperature in unused rooms	5.08	1.16
Cook with pots covered	5.06	1.01
Let the hot water run while brushing teeth (recoded)	5.23	1.38
Take a long shower (recoded)	4.39	1.56
TV is on, but no one is watching (recoded)	5.47	1.10
Turning off the light when leaving a room	5.31	0.91
Cronbach's α = .71		
Curtailment behavior in the mobility domain[a]		
Go on holidays by train	2.66	1.45
Avoid flights over short distances (i.e. to neighboring countries) for private purposes by using alternative means of travel	4.25	1.42
Carpool if a distance is covered by car	2.83	1.37
Cover short distances (£ 1 km) by bicycle or by foot	4.66	1.70
Cronbach's α = .54[b]		
Curtailment behavior in the food domain[a]		
Buy regional foods	4.31	0.93
Buy seasonal fruits and vegetables	4.79	0.93
Avoid buying foods flown in	3.80	1.32
Avoid buying foods from distant countries	3.81	1.25
Cronbach's α = .80		
Energy efficiency measures in the housing domain[c]		
When I buy electrical appliances, I consciously pay attention to their energy consumption.	1.15	0.36
Water taps are equipped with a flow controller	1.60	0.49
The shower is equipped with a water-conserving shower head	1.50	0.50
Cronbach's α = .51[b]		

(Table 3.1. continues)

(Table 3.1. continued)

Items	M	SD
Financial motive[d]		
I primarily pay attention to energy consumption in the household because of financial reasons.	4.33	1.43
When purchasing household appliances I pay attention to energy consumption because of the running costs.	4.45	1.42
Cronbach's α = .79		
Energy consciousness motive[d]		
I primarily pay attention to energy consumption in the household because of energy consciousness in general.	4.77	1.23
When purchasing household appliances, I pay attention to energy consumption because of energy consciousness.	4.76	1.27
When purchasing fruits and vegetables, I pay attention to seasonality and origin due to energy consciousness.	4.49	1.40
Cronbach's α = .79		

Note. N = 1,292. [a]Participants were asked to indicate how frequently they show the following behaviors. The scale ranges from 1 (*never*) to 6 (*always*). [b]Behavioral items are not expected to be highly correlated, therefore, alpha scores below .70 seem plausible [c]Participants were asked to indicate whether they have adopted or adopt the following energy-saving measures. They could answer with "yes" or "no." The resulting energy efficiency index for the housing domain, indicating the number of adopted energy efficiency measures, ranges between 0 and 3. [d]Participants were asked to indicate how much the following statements applied to them. The scale ranges from 1 (*applies not at all*) to 6 (*completely applies*).

Energy-saving behavior related to car use and purchase

For car owners and drivers, questions focusing specifically on energy-saving behavior related to car use and car purchase were included. In a first part, participants were asked to indicate on a six-point Likert scale, ranging from 1 (*never*) to 6 (*always*), how frequently they engaged in specific energy-saving behaviors related to car use. The question consisted of six items. A principal component analysis was conducted to check for the possibility to summarize the six items. Analysis revealed two factors that accounted for 59.34% of the original variance of subjects' frequency ratings. The first factor subsumed items related to the use of alternatives to the car and the second included items referring to energy-saving driving behavior (factor loadings are depicted in Table B1 in Appendix B). The first factor was well interpretable and the mean of the items was calculated. The items constituting the second factor varied considerably in value, and the interpretation of this factor was not completely conclusive; therefore, these items were considered individually.

The second car related part contained three items with regard to energy-saving behavior in the situation of a car purchase, i.e. energy efficiency measures. Participants answered with either "yes" or "no." A car energy efficiency index was created by summing up the number of energy efficiency considerations. The index ranged from "0," indicating that a subject considers no energy efficiency criterion, to "3," denoting that a subject considers all energy efficiency criteria listed.

Items used to measures subjects' energy-saving efforts related to car purchase and use were derived from available guides on how to save energy. All items including corresponding means and standard deviations are presented in Table 3.2.

Table 3.2. **Items Used to Measure Energy-Saving Behavior and Motives Related to Car Use and Car Purchase Including Means and Standard Deviations**

Items	M	SD
Energy-saving car use behavior: Alternatives to car[a]		
Use public transportation or bicycle for distances up to 3 km	3.12	1.58
Take the car even for short distances (< 2 km) (recoded)	3.97	1.65
Use public transportation or the bicycle if possible	3.49	1.76
Cronbach's α = .80		
Energy-saving car use behavior: Energy-saving driving[b]		
Turn off the engine even for a short wait at red light	2.92	1.54
Use the highest gear possible and drive with low engine RPM	4.75	1.20
Consciously drive no faster than 100 km/h on the highway	2.16	1.36
Energy efficiency measures related to car purchase[c]		
When I buy a car, I consciously pay attention to the energy consumption of the vehicle.	1.14	0.34
When I buy a car, I pay attention to the size and choose a small model.	1.42	0.49
When I buy a car, I pay attention to the environmental friendliness of the drive (natural gas, etc.).	1.66	0.47
Cronbach's α = .42[d]		

Note. N varied between 1,039 and 1,107 for the behavioral variables. [a]Participants were asked to indicate how frequently they engage in the following behaviors. The scale ranges from 1 (*never*) to 6 (*always*). [b]Participants were asked to indicate how frequently they engage in the following behaviors. The scale ranges from 1 (*never*) to 6 (*always*). Underlying items were considered separately; no mean or index was calculated. [c]Participants were asked to indicate whether they have adopted or adopt the following energy-saving measures. They could answer with "yes" or "no." The resulting energy efficiency index for car purchase, indicating the number of considered energy efficiency criteria, ranges between 0 and 3. [d]Behavioral items are not expected to be highly correlated, therefore, alpha scores below .70 seem plausible.

Acceptance of policy measures

In the questionnaire, eight different policy measures to decrease energy consumption were listed. Policy measures were derived partly from current political discussions about possible energy-related policy measures and partly from other studies (Steg, et al., 2006). Respondents were asked to rate on a six-point scale, ranging from 1 (*not at all acceptable*) to 6 (*completely acceptable*), how acceptable they perceive each policy measure. A principal component analysis was conducted revealing three factors that accounted for 68.86% of the original variance in the subjects' acceptance rating (factor loadings can be found in Table B2 in Appendix B). One factor included four policy measures reflecting sales regulations. The corresponding Cronbach's alpha was .77. Furthermore, three items constituted a second factor referring to regulations in the use, or rather maintenance, of a car. The reliability was satisfying with alpha = .77. The item "renew old nuclear power plants/replace old nuclear power plants with new ones in Switzerland" represented the third factor.

For the factors "sales regulations" and "use regulations in mobility," the means of the underlying items were computed. The items reflecting the different policy measures and the corresponding means and standard deviations are depicted in Table 3.3.

Table 3.3. **Items Used to Measure Acceptance of Policy Measures Including Means and Standard Deviations**

Items	M	SD
Nuclear power plants		
Renew old nuclear power plants/replace old nuclear power plants with new ones in Switzerland	3.46	1.79
Sales regulations		
Increase in purchase price of appliances with high energy consumption by 10%	4.36	1.64
Cessation of the sale of appliances with high energy consumption within a product category	4.80	1.48
Increase in purchase price of fruits and vegetables flown in	4.27	1.66
Increase in purchase price of cars with high energy consumption by max. CHF 3,000 while at the same time reducing purchase price of cars with low energy consumption by max. CHF 3,000	4.34	1.76
Cronbach's α = .77		
Use regulations in mobility		
Increase in fuel price by about 25 centimes/liter	2.72	1.81
Incentive tax of about 25 centimes/liter on fuels – revenues are redistributed to the population through health insurance funds	3.07	1.86
Charge for use of the roads in the town center of larger towns (Road pricing)	3.05	1.88
Cronbach's α = .77		

Note. N = 1,292. Participants were asked to indicate how acceptable they perceived each of the following policy measures. The scale ranges from 1 (*not at all acceptable*) to 6 (*completely acceptable*).

Beliefs related to energy-saving behavior

The questionnaire assessed different beliefs regarding energy-saving behavior. In a first part, subjects' beliefs related to response efficacy were assessed. Participants were provided with different behavioral measures to reduce energy consumption and were asked to rate their efficacy on a six-point scale, ranging from 1 (*not at all effective*) to 6 (*very effective*). Respondents' perceived self-efficacy regarding the performance of energy-saving actions was measured based on five items. Furthermore, one item was included to assess perceived personal efficacy. Items were presented in the form of statements, and subjects were requested to indicate on a six-point scale, ranging from 1 (*applies not at all*) to 6 (*completely applies*), how much the statements applied to them. To measure the three efficacy beliefs, we formulated our own items enabling us to specifically address the various energy-saving behaviors related to different domains.

In a next part, participants' awareness of consequences, ascription of responsibility, and personal norms were assessed. The corresponding items were generated based on items used by Steg et al. (2005). Three statements about the consequences of high energy consumption were formulated (awareness of consequences), and respondents had to indicate their degree of agreement on a six-point scale, ranging from 1 (*I completely disagree*) to 6 (*I completely agree*). Furthermore, three items were incorporated to measure perceived responsibility for the actual energy situation, and five items were included to assess personal norms related to energy consumption behavior. Subjects were requested to rate on a six-point scale, ranging from 1 (*applies not at all*) to 6 (*completely applies*), how much the statements applied to them. Cronbach's alpha of the different beliefs ranged from .73 to .92, indicating a high level of reliability. The belief items used and corresponding means and standard deviations are presented in Table 3.4.

General energy-related attitudes

Subjects were presented with statements reflecting general energy-related attitudes and were asked to indicate on a six-point scale how much the statements applied to them. The scale ranged from 1 (*applies not at all*) to 6 (*completely applies*). A principal component analysis was conducted yielding two factors that accounted for 69.39% of the original variance in participants' ratings (factor loadings are depicted in Table B3 in Appendix B). Four items formed the factor "basic convictions" that underlie energy-saving behavior and three items constituted the factor "loss of comfort." The factors showed satisfying reliability coefficients: alpha = .84 and alpha = .78, respectively (see Table 3.4).

Attitudes related to contextual forces

Items that assess attitudes related to contextual forces were also included. They were also presented in the form of statements. One item addressed the influence of social norms on energy-saving behavior. Social norms are reflected in perceived social pressure. As such, an item that specifically assesses subjects' perceived social pressure to save energy was formulated. An additional item indirectly reflected subjects' attitudes towards interferences of contextual forces (e.g., expectations) in general. The item contrasted enjoyment of life with an energy-conscious way of living. Furthermore, a third item addressed subjects' attitudes towards restrictions of freedom of choice imposed by political measures. For each item, participants were asked to rate on a six-point scale, ranging from 1 (*applies not at all*) to 6 (*completely applies*), how much the statement applied to them.

The items assessing general energy-related attitudes were generated based on inputs from focus group discussions about people's motivation to save energy and perceived barriers. All attitude items and the corresponding means and standard deviations are depicted in Table 3.4.

Table 3.4. **Items Used to Measure Psychosocial Factors (Beliefs and Attitudes) Related to Energy Consumption Including Means and Standard Deviations**

Items	M	SD
Beliefs		
Response efficacy[a]		
Reduction of electricity consumption in the household	4.37	1.33
Reduction of car/motor-bike use	4.40	1.38
Purchase of regional and seasonal products	3.83	1.58
Purchase of energy efficient appliances	4.92	1.18
Purchase of energy efficient cars	5.02	1.14
Cronbach's α = .80		
Self-efficacy[b]		
I know the areas of my household with the highest energy saving potential and, accordingly, I can/could optimize my consumption without any problems.	4.11	1.30
I have sufficient knowledge about the different travel options to shape my travel behavior energy consciously.	4.69	1.33
I am confident that I am able to make an energy-conscious decision when buying fruits and vegetables.	4.53	1.34
I am confident that I am able to make an energy-conscious decision when buying household appliances or cars.	4.92	1.17

(Table 3.4. continues)

(Table 3.4. continued)

Items	M	SD
I think that, due to my abilities, I can solve all problems related to energy I am confronted with.	4.05	1.28
Cronbach's α = .77		
Personal efficacy[b]		
The many small efforts I make to conserve energy add up, too, and can make a difference with regard to general energy consumption.	4.65	1.32
Awareness of consequences[c]		
The increasing energy demand is a serious problem for our society.	5.34	0.99
Global warming is a serious problem for our society.	5.43	1.00
The increasing shortage of energy sources is a serious problem for our society.	5.08	1.16
Cronbach's α = .73		
Ascription of responsibility[b]		
I feel jointly responsible for the shortage of fossil fuels (crude oil, natural gas, etc.).	3.72	1.49
I feel jointly responsible for global warming.	3.70	1.45
I feel jointly responsible for the shortage of energy sources.	3.56	1.47
Cronbach's α = .92		
Personal norms[b]		
I feel personally obliged to avoid unnecessary energy consumption wherever possible.	4.87	1.20
I feel guilty when I choose a mean of transportation with high energy consumption to cover a distance, even though there is an energy-friendlier travel option.	3.57	1.61
I have a bad conscience when energy is consumed unnecessarily in the household (e.g., leave lights on in unused rooms).	4.45	1.55
I have a bad conscience when I buy, e.g., strawberries from South Africa in the winter instead of a seasonal product from the region.	4.58	1.65
Cronbach's α = .75		
General energy-related attitudes[b]		
Basic convictions		
Energy conservation is important to me.	5.21	0.95
I intend to reduce/to further reduce my energy consumption.	4.86	1.07
Energy conservation goes without saying since I was brought up accordingly.	4.88	1.19
I pay attention to energy consumption because I care for the future of the next generation.	5.10	1.08
Cronbach's α = .84		
Loss of comfort		
To me, energy-saving behavior in the mobility domain entails losses of convenience that are too high.	3.00	1.49
To me, energy-saving behavior in the housing domain entails losses of comfort that are too high.	2.42	1.25
To me, energy-saving behavior in the food domain entails losses of welfare that are too high.	2.37	1.28
Cronbach's α = .78		

(Table 3.4. continues)

(Table 3.4. continued)

Items	M	SD
Attitudes related to contextual forces [b]		
Perceived social pressure		
I have the impression that nowadays one is nearly obliged to conserve energy due to society's expectations.	3.63	1.57
Enjoyment of life		
I want to enjoy life without giving a thought to energy consumption.	2.20	1.46
Interference of freedom of choice		
I think that the government encroaches too much upon the freedom of choice of the population in some domains (e.g., the banning of light bulbs).	2.89	1.74

Note. N of the item "perceived social pressure" was 1,289 and *N* of the item "enjoyment of life" was 1,287; for the remaining variables, *N* was 1,292. [a]Participants were asked to indicate how effective, in their opinion, the following measures are in improving the energy situation. The scale ranges from 1 (*not at all effective*) to 6 (*very effective*). [b]Participants were asked to indicate how much the following statements applied to them. The scale ranges from 1 (*applies not at all*) to 6 (*completely applies*). [c]Participants were asked to indicate how much they agreed with the following statements. The scale ranges from 1 (*I completely disagree*) to 6 (*I completely agree*).

Energy-related knowledge

Subjects were presented with 13 statements assessing energy-related knowledge. Since, to the best of our knowledge, no established scale exists that specifically assesses energy-related knowledge, we developed our own knowledge items partly based on Piskernik (2008). Items were formulated in the form of statements, and respondents were asked to indicate whether they were "true" or "false." Subjects also had the possibility of choosing the answer option "I don't know." Seven out of the 13 statements were true and six were false. Correct answers were coded as "1," and incorrect or "I don't know" answers were coded as "0." To increase reliability of the knowledge scale, two items with a very low corrected item-total correlation (less than .10) were excluded. The resulting scale consisted of 11 items and had a Cronbach's alpha of .51, which is rather low, but in line with findings of other studies investigating people's knowledge about environmental issues (see Piskernik, 2008). The items constituting the energy knowledge scale, including means and standard deviations, are depicted in Table 3.5. By counting the number of correct answers, an energy knowledge index was generated. The index ranged from 0 to 11.

Table 3.5. **Items Used to Measure Energy-Related Knowledge Including Means and Standard Deviations**

Items	M	SD
CO_2 emission plays an important role in the context of global warming. *T*	0.92	0.27
To guarantee fresh air in the household in the winter, opening a hopper window for some time is most energy-saving. *F*	0.74	0.44
To heat up to one liter of water using the electric kettle is more energy-saving than using the hot plate. *T*	0.73	0.45
In Switzerland, electricity is produced almost exclusively from nuclear power. *F*	0.71	0.46
Washing dishes using a dishwasher can be more energy-saving than hand washing. *T*	0.70	0.46
The energy balance of meat is better compared to that of vegetable food. *F*	0.59	0.49
During the electricity production process in a nuclear power plant, CO2 is emitted. *F*	0.56	0.50
Most energy consumed in Switzerland stems from fossil fuels (e.g., crude oil, natural gas or coal). *T*	0.51	0.50

(Table 3.5. continues)

(Table 3.5. continued)

Items	M	SD
In the household, hot water consumes the most energy; heating (room heating) follows in second place. *F*	0.49	0.50
At the moment, Switzerland depends 80% on imported energy. *T*	0.43	0.50
Mobility inside Switzerland accounts for the largest proportion of Swiss energy consumption; heating (room heating) follows in second place. *F*	0.24	0.42
Cronbach's α = .51		

Note. N = 1,250. The accuracy of the statements is indicated by *T* (true) and *F* (false). Correct answers were coded as "1" and incorrect or "I don't know" answers were coded as "*0*."

3. Results

3.1. Clustering the Energy Consumer

To identify and profile the different energy consumer segments, a cluster analysis was conducted. Clusters were identified based on the following segmentation variables: energy-saving actions based on curtailment in the housing, mobility, and food domain; energy-saving actions based on energy efficiency; financial motive; energy consciousness motive; acceptance of policy measures; beliefs concerning response efficacy, self-efficacy, personal efficacy, awareness of consequences, ascription of responsibility, and personal norms; basic convictions; and perceived loss of comfort. The variables were standardized and subjected to hierarchical cluster analysis, applying Ward's method. The squared Euclidean distance was used as the proximity measure in the clustering procedure.

The percentage change in the clustering coefficient, with a reduction in the number of clusters, served as a first indication of the optimal cluster solution (Backhaus, Erichson, Plinke, & Weiber, 2003). The agglomeration schedule suggested a five- or a six-cluster solution. In the five- and six-cluster solutions, the sizes of the segments were sufficiently large to be efficiently addressed by energy-saving strategies. Furthermore, in the five- and the six-cluster solutions, significant and meaningful differences were found across all 17 segmentation variables underlying cluster analysis. Since the sixth cluster in the six-cluster solution differed significantly in several segmentation variables from the other five clusters providing further interesting insights into the various types of energy consumers, the six-cluster solution was selected.

3.2. Characterizing the Energy Consumer Segments

Six energy consumer segments were identified: the *idealistic* energy-saver (15.6%), the *self-less inconsequent* energy-saver (26.4%), the *thrifty* energy-saver (14%), the *materialistic* energy consumer (25.1%), the *convenience-oriented indifferent* energy consumer (5.3%), and the *problem-aware well-being-oriented* energy consumer (13.6%). In a next step, the segments were tested for their homogeneity calculating the *F*-value for all variables of the six segments, which is the quotient of the variance of a variable within a segment and the variance of the variable in the survey population. A segment is considered completely homogeneous if all *F*-values are smaller than one (Backhaus, et al., 2003). The segments selfless inconsequent, materialistic, and problem-aware well-being-oriented consumers were found to be completely homogeneous, while idealistic and thrifty consumers were nearly homogeneous with one respectively five *F*-values larger than one out of 17 segmentation variables. The smallest segment, the convenience-oriented indifferent consumers, was least homogeneous, containing nine *F*-values larger than one. Analyses of variance revealed a significant effect of energy consumer segments for each segmentation variable ($p < .001$). In the following, the characteristics of energy consumer segments on the segmentation variables are discussed.

Energy-friendly behavior

Idealistic energy savers showed the highest energy-saving efforts with regard to curtailment as well as energy efficiency measures. Thrifty energy savers follow in second place. However, in contrast to idealistic savers, their actions are mainly driven by financial considerations. Considerable saving efforts in terms of curtailment are also shown by selfless inconsequent consumers. However, given the appreciable curtailment efforts, their adoption rate of energy efficiency measures is rather low. The importance to distinguish between energy-saving purchasing behavior of daily products and energy efficiency becomes apparent in the example of the materialistic energy consumers. Their engagement in curtailment behavior, especially in the mobility and food domain, is low compared to other segments, while energy-saving actions based on energy efficiency are quite pronounced. If they engage in saving behaviors, financial considerations are the main driver. Problem-aware well-being-oriented and convenience-oriented indifferent energy consumers are least likely to engage in energy-saving efforts.

Regarding indirect energy-saving behavior in terms of the acceptance of policy measures, idealistic savers indicate the highest acceptance of sales and use regulations. Compared to the other segments, they most strongly reject policy measures intending to renew nuclear power plants or replace them with new ones, which indicates that their energy-saving behavior is driven by idealistic thoughts. Sales and use regulations are the second-highest accepted by selfless inconsequent savers, reflecting their readiness to make sacrifices. Thrifty energy savers, although engaging in considerable curtailment and energy efficient actions, are less willing to accept sales and use regulations, especially use regulations that are associated with additional financial efforts. The same holds true for materialistic consumers. Problem-aware well-being-oriented and convenience-oriented indifferent consumers feel the most reluctant towards sales and use regulations. Table 3.6 presents the six energy consumer segments and the corresponding means of the segmentation variables representing energy-saving behaviors and the underlying motives.

Table 3.6. **Characterization of Energy Consumer Segments with Regard to Segmentation Variables Representing Energy-Saving Behavior and Motives**

	Idealistic (n = 202)	Selfless inconsequent (n = 341)	Thrifty (n = 181)	Materialistic (n = 324)	Convenience-oriented indifferent (n = 68)	Problem-aware well-being-oriented (n = 176)
Energy-saving behavior						
Curtailment, housing	5.30a	4.96b	**5.32a**	4.82c	4.19d	4.37d
Curtailment, mobility	**4.24a**	3.88b	3.91b	3.32c	2.54e	2.94d
Curtailment, food	**4.78a**	4.30b	4.74a	3.90c	3.67c,d	3.37d
Energy efficiency, housing	**2.43a**	1.31c	2.19b	2.04b	1.51c	0.97d
Energy-saving motives						
Financial	4.49b	4.05c	**5.32a**	4.70b	3.68c,d	3.68d
Energy consciousness	**5.55a**	4.75b	5.41a	4.63b	3.36c	3.37c
Acceptance of policy measures						
Nuclear power plants	2.33c	3.28b	3.94a	3.46b	**4.34a**	4.28a
Sales regulations	**5.55a**	5.01b	4.37c	4.11c	2.42e	3.51d
Use regulations in mobility	**4.53a**	3.51b	2.48c	2.40c	1.60e	2.06d

Note. Analyses of variance revealed a significant effect of energy consumer segments for all segmentation variables, $p < .001$. Different letters indicate significant differences between particular energy consumer segments, $p < .05$, using the Games-Howell post-hoc test. For each segmentation variable, the value of the segment with the highest score is in bold.

Beliefs related to energy-saving behavior

In line with the findings of previous studies, consumer segments engaging in more energy-friendly actions are generally more aware of consequences, are more likely to ascribe the responsibility for the actual energy situation to themselves, and their personal norms concerning energy-saving behavior are more established. According to research on people's beliefs regarding the efficacy of energy-saving actions, the general pattern of results indicates that consumer segments adopting more energy-saving measures are more likely to appraise the efficacy of the applicable energy-saving measures as high, are more confident that they possess the necessary skills to take effective energy-saving actions, and believe that their individual behavior can induce a positive change.

Despite their small energy-saving efforts, problem-aware well-being-oriented energy consumers have a rather pronounced awareness of consequences and they believe that their own energy-saving efforts can make a difference. However, they still do not feel obliged to engage in energy-saving actions that would consequently result in increased energy-saving efforts. This is the main difference to convenience-oriented indifferent consumers who also only demonstrates minor energy-saving efforts, but consistently perform low on all beliefs related to energy-saving, e.g. awareness of consequences, personal efficacy. Selfless inconsequent savers have profoundly established efficacy beliefs, which are obviously not consequently translated into energy-saving actions, especially with regard to the food domain and energy efficiency. The six energy consumer segments with corresponding means of the segmentation variables representing beliefs related to energy-saving behavior are depicted in Table 3.7.

General energy-related attitudes

Consumer segments highly engaging in energy-saving measures are more driven by basic convictions related to energy-saving attempts. These basic convictions are most pronounced amongst idealistic energy savers. The loss of comfort related to energy-saving behavior constitutes especially for convenience-oriented indifferent consumers a barrier to energy-saving behavior, followed by problem-aware well-being-oriented consumers. Materialistic consumers, on the other hand, are less concerned about restrictions of convenience, but more about financial issues. The corresponding means are presented in Table 3.7.

Table 3.7. **Characterization of Energy Consumer Segments with Regard to Segmentation Variables Representing Beliefs and Attitudes Related to Energy-Saving Behavior**

	Idealistic (n = 202)	Selfless inconsequent (n = 341)	Thrifty (n = 181)	Materialistic (n = 324)	Convenience-oriented indifferent (n = 68)	Problem-aware well-being-oriented (n = 176)
Beliefs						
Response efficacy	**5.35a**	4.82b	4.73b	4.21c	2.96e	3.86d
Self-efficacy	**5.02a**	4.58b	4.86a	4.42c	3.51d	3.60d
Personal efficacy	**5.50a**	4.97b	4.22d	4.73c	2.72e	4.10d
Consequence awareness	**5.79a**	5.56b	5.50b	5.05c	3.34d	5.11c
Responsibility ascription	**4.61a**	3.88b	3.54b,c	3.47c	2.12d	3.22c
Personal norms	**5.28a**	4.67b	4.87b	4.06c	2.75e	3.43d
General attitudes						
Basic convictions	**5.67a**	5.21b	5.54a	4.93c	3.41e	4.11d
Loss of comfort	1.65d	2.12c	2.98b	2.83b	**3.65a**	3.38a

Note. Analyses of variance revealed a significant effect of energy consumer segments for all segmentation variables, $p < .001$. Different letters indicate significant differences between particular energy consumer segments, $p < .05$, using the Games-Howell post-hoc test. For each segmentation variable, the value of the segment with the highest score is in bold.

In a next step, the identified energy consumer segments are characterized based on the variables that were included in the study as descriptive variables; energy-saving behavior related to car purchase and car use, attitudes related to contextual forces (perceived social pressure, enjoyment of life, and interference of freedom of choice), energy-related knowledge, and sociodemographics. Analyses revealed a significant effect of energy consumer segments for each of these descriptive variables.

Energy-saving efforts of car owners and car drivers

Idealistic and selfless inconsequent energy-savers represent the segments with fewest car owners, whereas materialistic consumers constitute the segment with the most car owners. In line with the findings regarding the energy-saving efforts discussed above, car owners and drivers of consumer segments demonstrating more energy-saving actions with regard to housing, mobility, and food were found to engage in more energy-saving behaviors related to car purchase and use. They are more likely to consider energy efficiency criteria when buying a car, more often choose energy-saving alternatives to the car, such as public transportation, and drive in a more energy-saving manner (Table 3.8).

Table 3.8. **Comparison of Car Owners and Car Drivers of the Different Energy Consumer Segments**

	Idealistic (n = 202)	Selfless inconsequent (n = 341)	Thrifty (n = 181)	Materialistic (n = 324)	Convenience-oriented indifferent (n = 68)	Problem-aware well-being-oriented (n = 176)
Car owners	74.3%	75.4%	81.2%	**89.8%**	88.2%	85.7%
Energy efficiency criteria	**2.24a**	1.98b	1.89b,c	1.67c	1.22d	1.31d
Use/driving behavior						
Use alternatives to car	**4.33a**	3.87b	3.59b,c	3.25c,d	2.53e	2.88d,e
Turn off engine at red light	**3.49a**	3.00b,c	3.35a,b	2.87c	2.00d	2.34d
Eco Drive	**5.15a**	4.87a,b	5.06a,b	4.74b	4.05c	4.27c
No faster 100 km/h freeway	**2.75a**	2.02b	2.52a	2.07b	1.61b	1.76b

Note. Analyses revealed a significant effect of energy consumer segments for all variables, $p < .001$. Different letters indicate significant differences between particular energy consumer segments, $p < .05$, using the Games-Howell post-hoc test. For each descriptive variable, the value of the segment with the highest score is in bold.

Attitudes related to contextual forces

Thrifty energy-savers feel the most obliged to save energy because of society's expectations, followed by problem-aware well-being-oriented energy consumers. Furthermore, the convenience-oriented indifferent energy consumer most strongly takes the stance that enjoyment of life comes first and that considerations of energy consumption should not interfere with this priority. He is also the one who most strongly disapproves the interference of freedom of choice imposed by political measures. The corresponding values for each segment can be extracted from Table 3.9.

Finally, in the following section, energy consumer segments are distinguished according to their energy-related knowledge and sociodemographic characteristics.

Energy-related knowledge and demographic profile

The well-educated idealistic energy savers are most knowledgeable in terms of energy-related issues, followed by the selfless inconsequent energy savers. The segment of the idealistic energy-savers showing most energy-saving behavior is composed of the highest per-

centage of women. Consumer segments with less pronounced energy-saving efforts are predominantly male. The thrifty energy-savers form the oldest segment and they have the lowest income. The problem-aware well-being-oriented consumers represent the segment with the youngest members. Energy consumer segments and an extract of corresponding characteristics are depicted in Table 3.9.

Table 3.9. **Comparison of Energy Consumer Segments Based on the Descriptive Variables Representing Attitudes Related to Contextual Forces, Energy-Related Knowledge, and Sociodemographics**

	Idealistic (n = 202)	Selfless inconsequent (n = 341)	Thrifty (n = 181)	Materialistic (n = 324)	Convenience-oriented indifferent (n = 68)	Problem-aware well-being-oriented (n = 176)
Attitudes rel to contextual forces						
Perceived social pressure***	3.06c	3.52b	**4.07a**	3.68a,b	3.76a,b	3.90a
Enjoyment of life***	1.34e	1.89d	2.09c,d	2.34c	**3.97a**	2.93b
Intfr of freedom of choice***	1.90d	2.63c	3.36a,b	3.15b	**3.97a**	3.15b
Energy-related knowledge* **	**7.35a**	6.89a	6.34b	6.44b	5.84b	5.93b
Sociodemographics						
*Gender****						
Female	**53.3%**	45.4%	47.2%	29.2%	25.4%	31.2%
Male	46.7%	54.6%	52.8%	70.8%	**74.6%**	68.8%
*Age in years****	53.89	50.97	**58.21**	51.71	52.55	48.42
*Income class****						
Less than CHF 3,000	3.0%	6.4%	**12.4%**	6.4%	10.4%	3.5%
CHF 3,000 – CHF 5,000	24.7%	22.6%	**28.2%**	20.2%	14.9%	20.6%
CHF 5,000 – CHF 10,000	**53.0%**	45.0%	46.3%	50.3%	41.8%	48.2%
More than CHF 10,000	19.2%	26.0%	13.0%	23.1%	**32.8%**	27.6%
*Educational level****						
Primary school	4.0%	3.0%	8.3%	6.0%	**12.3%**	5.2%
Secondary school	4.0%	6.3%	**11.1%**	6.0%	10.8%	5.8%
Vocational training	31.8%	27.5%	**36.1%**	35.2%	24.6%	27.7%
Grammar school degree	8.5%	**11.4%**	11.1%	9.1%	7.7%	9.8%
Higher vocational college	21.9%	19.8%	20.6%	**22.3%**	21.5%	22.0%
University of applied sciences	**16.4%**	12.6%	7.2%	9.4%	12.3%	10.4%
University	13.4%	**19.5%**	5.6%	11.9%	10.8%	19.1%

Note. * $p < .05$, ** $p < .01$, *** $p < .001$. For each descriptive variable, the value of the segment with the highest score is in bold. For attitudes related to contextual forces and energy-related knowledge, post hoc tests were performed; different letters indicate significant differences between the particular energy consumer segments, $p < .05$, using the Games-Howell post-hoc test.

3.3. Brief Summary of Energy Consumer Segments

Idealistic energy-savers (15.6%)

Idealistic energy-savers show the most energy-saving efforts based on curtailment behavior as well as based on energy efficiency measures. Driven by idealistic thoughts, they do not mind financial efforts and restrictions of convenience and also fully accept policy measures in terms of sales and use regulations. Their awareness of consequences is highly pronounced and they believe in their ability to induce a positive change.

Selfless inconsequent energy-savers (26.4%)

Selfless inconsequent energy-savers demonstrate considerable energy-saving efforts. But given their readiness to make sacrifices reflected in their high acceptance of policy regulations, their pronounced awareness of consequences, and their belief that consumers' energy-saving actions can make a difference, energy-saving efforts seem rather inconsequential. Energy-saving actions, in particular, with respect to curtailment behavior in the food domain and energy efficiency measures in the housing domain, are comparatively small.

Thrifty energy-savers (14%)

Thrifty energy-savers highly engage in energy-saving efforts as long as they involve no financial disadvantages. Accordingly, they disapprove of policy measures based on sales or use regulations that are associated with additional financial efforts. Their energy-saving efforts are, in general, rather extrinsically motivated, since besides financial considerations they also experience the most social pressure to engage in energy-saving behavior.

Materialistic energy consumers (25.1%)

Materialistic energy consumers show less energy-saving efforts, especially in the domains of mobility and food. Energy-saving actions based on energy efficiency measures in the housing domain, however, are considerably pronounced. Policy measures with possible financial consequences are less accepted. If they engage in energy-saving behavior, this is mainly due to financial considerations.

Convenience-oriented indifferent energy consumers (5.3%)

Convenience-oriented indifferent energy consumers are least likely to engage in energy-saving actions. They largely ignore the fact that the increase in energy consumption and its consequences constitute a serious problem for society, and they neither feel jointly responsible for the present energy situation, nor have energy consciousness anchored in their personal norms. Their behavior is less driven by financial considerations than by concerns regarding personal comfort and convenience. Restrictive political regulations and interferences are strongly disapproved of.

Problem-aware well-being-oriented energy consumers (13.6%)

Problem-aware well-being-oriented energy consumers are not eager to engage in energy-saving actions. Their awareness of consequences is rather pronounced and they believe that their energy-saving efforts can make a difference. However, they still do not feel obliged to avoid unnecessary energy. Furthermore, they consider their ability to perform energy-saving behaviors as rather limited. A possible loss of comfort and convenience constitutes a barrier to their engagement in energy-saving efforts, but on the other hand, they perceive a certain social pressure to save energy.

4. Discussion

The aim of this study was to identify different segments of energy consumers in comprehensive terms, using a cluster analytic approach. Therefore, behavioral measures, as well as energy-related psychosocial variables, were determined to form the segmentation base. The behavioral measures were distinguished according to curtailment actions, adoption of energy efficiency measures, and acceptance of policy measures. Applying this procedure, six different energy consumer segments were identified that are of sufficient significance to be targeted in energy conservation campaigns: the idealistic energy saver (15.6%), the selfless inconsequent energy saver (26.4%), the thrifty energy saver (14%), the materialistic energy consumer (25.1%), the convenience-oriented indifferent energy consumer (5.3%), and the problem-aware well-being-oriented energy consumer (13.6%). Despite the differing segmentation bases or criteria that were used in other studies, some consumer segments identified in the present study are similar to the ones found in previous research. For instance, the segment “family-attached materialists” described by Wortmann and colleagues (1996) corresponds, to some extent, to the materialistic consumers identified in the present study. In both cases, the segments are described as being materialistic and engaging in few saving efforts, unless energy-saving behavior is associated with technical improvements, i.e. energy efficiency measures, which they are gladly willing to adopt. Furthermore, the segment “pleasure-oriented” identified by Prose and Wortmann (1991) and the convenience-oriented indifferent energy consumers are similar in their characteristics, since both segments are described as fun-oriented and largely disinterested in energy-related issues. However, the present study provides additional intriguing insights with regard to the differentiation of energy consumers by identifying new energy consumer segments and offering a comprehensive characterization of the different energy consumer types.

Marketing and policy implications

Idealistic energy savers already show an exemplary energy-saving way of living. Consequently, there is no need for intervention. The only objective, if any, is to ensure that idealists maintain their energy-saving efforts. This could be encouraged by regularly providing them with information about the energy situation, related problems, and possible solutions. The same holds true for the thrifty energy savers who also engage in many energy-saving behaviors. However, their motivation is mainly of a financial nature, which is not surprising since they represent the segment with the lowest income. Their aversion to policy measures that entail financial restrictions can be partly counteracted by systematically establishing corresponding social norms, since the thrifty consumer perceives the highest social pressure. The influence of social norms on environmentally responsible behavior has been shown in various studies (for a review, see Biel & Thogersen, 2007). Given their interest in energy-saving and financial issues, information campaigns stressing the financial consequences of energy-saving measures represent a suitable instrument to target thrifty energy savers. Information events, for example, also provide an optimal opportunity to sensitize consumers to the implementation of regulatory interventions aiming to reduce energy consumption. Thereby, it is important to emphasize the value of each individual’s contributions and collective thinking. Such events are an ideal setting to establish corresponding social norms.

A segment of greater interest for energy conservation campaigns is the selfless inconsequent energy saver, since this segment is of significant size and offers various starting points. Despite their high problem awareness and their belief in the efficacy of existing measures and consumers’ efforts, these energy consumers seem rather inconsequent in translating their thinking into action. This is the case for food-related energy-saving behavior, which is substantially lower compared to idealistic and thrifty energy savers, and especially for energy efficiency measures in the housing domain, which were adopted second-least of all segments. Both energy-saving behaviors are purchase-related, which might support Peattie’s (2001) assumption that the green purchaser is not necessarily the same person as the green consumer and vice versa. It is unlikely that their behavior is based on financial or well-being-related considerations, as they do not really care about materialistic values and

are ready to make sacrifices with respect to convenience and financial issues. One possible explanation could be that selfless inconsequent consumers are skeptical about the truth of the environmental product claims of producers and retailers and, consequently, about the efficacy of energy-saving purchasing behavior as well (see Peattie, 1995). Their extremely deep adoption rate of energy efficiency measures in the housing domain could additionally be related to a certain technology aversion. This assumption is supported by studies that described the green consumer as more or less technology-aversive (Gardner & Stern, 2002). To sum up, this has the following marketing and policy implications. Environmental claims of products should be formulated carefully without exaggeration. The related product labels should be awarded and controlled by one single independent competent body that will not be able to take advantage. This procedure increases consumers' trust in the information source and, consequently, the credibility of environmental claims and the perceived efficacy of energy-saving purchasing behavior (Teisl, Rubin, & Noblet, 2008; for an overview, see Thogersen, 2000). Furthermore, specific information about the high energy-saving potential of energy efficient investments compared to curtailment measures (Gardner & Stern, 2002) provided by trusted experts could temper existing prejudices against technological solutions and increase consumers' willingness to adopt energy efficiency measures. With high problem awareness, the basic requirements are already present and ensure that rational and objective arguments are well-received and, consequently, prove to be effective. The best way to target selfless inconsequent energy savers is by providing them with information about the trustworthiness of product labels and the high energy-saving potential of energy efficient products directly at the point of sale. The information can be communicated directly by the salesperson or by product brochures.

Previous research has shown that cost savings may be a main driver of energy-saving behavior (e.g., Brandon & Lewis, 1999; Downs & Freiden, 1983). This could be a starting point for conservation campaigns designed to address the materialistic energy consumers that highly value materialistic possessions and tend to think about energy-saving efforts in financial terms. This way of thinking is also reflected in their high adoption rate of energy efficient household appliances that offer them the benefit of energy cost savings without affecting their quality of life. The rather low energy-saving efforts in the food and mobility domain could be seen as an indication that the behavioral barrier is less about the concern for loss of comfort or convenience, but more about maintenance of the quality of life or even of status. Therefore, besides providing financial incentives in terms of subsidies, price reductions, or rewards (for a review, see Abrahamse, Steg, Vlek, & Rothengatter, 2005), it is also important to convey that energy-saving behavior and quality of life are not mutually exclusive. For example, in the case of a car purchase, it is essential that besides the emphasis on financial benefits, a new image is established that presents energy efficient cars as innovative, modern, and future-oriented and progressing on from the image of low-performing energy efficient products (Sammer & Wuestenhagen, 2006).

The two segments that show the least engagement in energy-saving efforts are the convenience-oriented indifferent and the problem-aware well-being-oriented energy consumers. Convenience-oriented indifferent consumers are rather uninterested in energy issues since they largely neglect the existence of energy-related problems and feel neither responsible nor obligated to act. Thus, attempts to increase their energy consciousness are likely to be condemned to fail. The only goal they pursue is to enjoy life and savor comfort and convenience. Financial considerations are only of secondary importance. As Gatersleben (2001) stated, certain individuals seem to be more willing to pay to sustain their comfort and pleasure than to give up some of their quality of life. The most promising way to bring these consumers closer to energy-saving behavior is by designing campaigns that evoke curiosity and address consumers' desire for pleasure and novel experiences. One possibility could be to hold events where consumers have the possibility to test-drive energy efficient cars.

The problem-aware well-being-oriented energy consumer attaches high importance to comfort and convenience, but also to financial aspects. The problem-aware well-being-oriented and the convenience-oriented indifferent consumers differ from each other on one decisive

point: the problem-aware well-being-oriented consumer is thoroughly aware of the energy-related problems and believes in consumers' ability to make a considerable contribution by their energy-saving efforts. Since the problem-aware well-being-oriented consumers constitute the youngest segment, a possible reason for the higher problem awareness could be that they have grown up in a time period where the environmental problem has been an often-discussed issue, for example at school or in the media, and is thus more salient (Straughan & Roberts, 1999). This awareness might provide a valuable basis that can be drawn on when developing strategies to encourage energy-saving behavior. Specific information campaigns, such as workshops or the distribution of brochures, with clearly comprehensible, concrete instructions on how to act energy-saving, should be developed with special emphasis on energy-saving actions requiring no or minimal efforts. Furthermore, the resulting financial benefits should be stressed. This procedure possibly increases consumers' energy knowledge and, at the same time, their perceived self-efficacy. The problem-aware well-being-oriented consumer enjoys comfort and convenience and wants to maintain a certain lifestyle. However, he also seems to care about how other people perceive his energy-related behavior, since he feels a certain social pressure. Thus, it could be assumed that besides a comfortable lifestyle, it is also of importance to him to have a certain status or positive image in the eyes of his surroundings. Such a merely self-interested way of thinking can be considered as a chance to promote proenvironmental behavior (De Young, 2000). If energy saving measures are conveyed as implying a certain status (Griskevicius, et al., 2010), his motivation to engage in energy-saving behavior could be increased, especially when it comes to measures that are clearly visible to others, i.e. energy efficiency measures, such as purchasing an energy efficient car. Furthermore, promoting energy efficient investments, such as household appliances and cars, as innovative, progressive, and exclusive products that are highly compatible with the lifestyle of the problem-aware well-being-oriented consumer could further increase his willingness to buy energy efficient products. In addition, using a modeling approach (Winett, Leckliter, Chinn, Stahl, & Love, 1985), i.e. social learning, commercials could be run with celebrities representing a dynamic and progressive lifestyle who promote energy efficient appliances.

Interventions that are designed and implemented to target a specific energy consumer segment inevitably also affect other consumer segments. Consequently, the question arises as to whether interventions that are designed for one segment could counter-productively affect on members of other segments by undermining their motives that are probably of a different nature. This could especially be true for individuals, such as idealistic energy consumers, that possess a strong intrinsic motivation and internalized norms to engage in energy-saving measures. By confronting these consumers with external rewards, such as financial incentives that are intended to address materialistic consumers, their intrinsic motivation is destroyed through a process known as motivational crowding-out (Deci, 1971). However, this crowding-out effect takes only place if individuals have a substantial amount of environmental morale before an external intervention takes place (Frey & Stutzer, 2008). To mitigate, or even avoid, a crowding-out effect caused by external interventions, such as legal regulations or financial incentives, it is essential that these interventions be communicated as having a supporting, rather than a controlling, function. Furthermore, it is important to promote consumers' self-determination; for instance by emphasizing that they have a choice in their actions (for an overview, see Frey & Stutzer, 2008).

Limitations

There are also some limitations to the present study that need to be addressed. This study relies on self-reports to measure behavior. Therefore, as it is generally the case in research relying on self-reports, our study is susceptible to the social desirability response bias, which is individuals' tendency to respond in a manner they consider to be socially desirable (Randall & Fernandes, 1991). This leads to a denial or mitigation of socially undesirable behaviors, attitudes, and personality traits, and an overstatement of socially desirable ones. Another characteristic of self-reported data is that they reflect a person's beliefs and perceptions of his/her own behavior rather than actual behavior. This is problematic insofar as peo-

ple's perceptions of energy consumption and savings of energy-related behaviors are subject to misconceptions (e.g., Attari, et al., 2010). As such, self-reported energy-saving behavior cannot be equated with actual energy savings (for an overview, see Gatersleben, Steg, & Vlek, 2002). However, as the aim of the study was to describe energy consumers in a comprehensive way, including various energy-saving actions of different domains, a measurement of real behavior in simultaneous regards to all these energy-saving measures is hardly feasible. Given this, it was necessary to rely on self-reported data in order to obtain a comprehensive picture of energy consumers. Nevertheless, we believe that meaningful results can be acquired from self-reported data.

A further issue that requires reflection and must be kept in mind when interpreting the results is the validity of items that were used in the questionnaire. Some items, especially behavioral items, were rather vaguely formulated and left room for interpretation; as such, they are prone to discrepancies in interpretation and perception among subjects. As a result, the interpretability of subjects' responses related to these items might be somewhat limited; this should be kept in mind when interpreting related findings that concern the composition and the description of the identified clusters. Since we developed some items utilized to measure energy-saving behavior and motives by ourselves, we are unable to provide information about their reliability and validity, aside from Cronbach's alpha and the meaningfulness of results that were gleaned from the study. However, additionally conducted analyses in which the most vaguely formulated items were omitted yielded similar results; emerging clusters were comparable to the ones identified in former analyses in which all items were included, as the general pattern of difference among clusters persisted and the main characteristics of the individual clusters remained the same. At least in part, these analyses provide evidence that vaguely formulated items did not distort the results and, thereby, lend support for the suitability and interpretability of the identified energy consumer types.

Contextual forces are a crucial factor underlying energy-related behavior because they support or hinder change towards a more energy-friendly behavior (Black, et al., 1985; Guagnano, et al., 1995). In our study, contextual forces were only indirectly addressed through participants' beliefs and attitudes related to these external factors (e.g., perceived social pressure), and we included only a small subset of contextual aspects. However, given the limited space of a questionnaire, a comprehensive assessment of all relevant contextual forces that exert an influence on the specific energy-related behaviors was hardly feasible. Moreover, the strength and influence of specific contextual forces differ between countries. For example, in some countries (e.g. Switzerland) public transport connections are readily available and provide a valid alternative to car use, whereas in other countries (e.g. the USA), the possibility of public transport use as an alternative to car use is not guaranteed throughout the country. Therefore, the limited accessibility to public transport in some countries constitutes a strong contextual barrier to energy-saving mobility behavior, whereas in other countries, this contextual factor has less of an influence on behavior. Since contextual factors are rather country-specific, generalizability is limited.

The time around which the study was conducted could also be considered as a certain limitation. Data collection took place from mid-November to the end of January, which means that the survey was conducted during a period when plenty of energy is consumed in the form of heating. The fact that the energy consumed for heating purposes and possibly the energy demand in general is more salient during this period could lead to an overestimation of energy consumption. But, as all consumers of the different segments are equally likely to show a tendency to overestimate their energy consumption, the differences found between the six energy consumer segments are assumed to be unaffected.

A final limitation concerns the generalizability of the findings. As this study is based on energy-saving efforts and energy-related attitudes of energy consumers in Switzerland, it is unknown whether the results hold true for other European countries and, thus, also provide a suitable basis for the development of marketing strategies outside Switzerland. However,

since the present study is based on a representative sample of the population and even considers two different language regions, generalizability may be more readily assumed than in other studies that restricted their survey to a specific region, like a city (Prose & Wortmann, 1991) or a federal state (Wortmann, et al., 1996), or to a sample meeting specific criteria, such as owning a car (Jansson, et al., 2009).

Conclusions

As one of the few energy consumer segmentation studies that applied a cluster analytic approach, this research provides support for the differentiation of purchase-related behavior when profiling energy consumers. The distinction between energy-related purchase decisions consumers are frequently faced with, such as food-related buying decisions, and purchase decisions regarding energy efficiency investments proved to be crucial for the identification and differentiated description of energy consumers, especially with regard to the materialistic energy consumer. Materialistic consumers showed considerable adoption of energy efficient measures in the housing domain, whereas their efforts in energy-saving food purchasing were low. This indicates that these two energy-friendly behaviors are psychologically different and should therefore be considered separately.

A further interesting finding emerging from this segmentation study is the suggestion of the existence of a segment of consumers who are rather unmotivated to engage in energy-saving behavior while at the same time showing considerable problem awareness: the problem-aware well-being-oriented energy consumers. Therefore, it is important to note that low performers striving only for comfort and convenience should not be generally perceived as a lost cause since amongst these low performers, a considerable number of individuals is thoroughly problem-aware. This provides an encouraging basis for a successful motivation of consumers towards a more sustainable lifestyle using adequate campaigns and communication measures.

Furthermore, the findings of this study support the approach of using behavioral variables and variables directly related to behavior, such as beliefs, motives and attitudes, as a segmentation base instead of sociodemographics or more abstract variables, such as general values, that are conceptually rather distant from energy consumption behavior.

As a next step, with regard to the development of marketing and intervention strategies, the classification of energy consumers provided by the present study could be used to test the efficacy of different intervention strategies. The different consumer segments could be presented with different intervention alternatives and, based on the observed responsiveness, the most effective intervention for each energy consumer segments could be identified. This would be a further important step towards the development of tailored, effective marketing and intervention strategies.

Does the Energy-friendly SUV Driver Exist in People's Minds? The Reliance on Symbolic Significant Behavioral Attributes when Judging Others' Behaviors

1. Introduction

Given the manifold properties and features of decision objects and situations people are confronted with in everyday life, they make use of mental shortcuts (i.e., heuristics) that reduce cognitive or computational effort and save time (for an overview, see Gigerenzer & Gaissmaier, 2011; Todd & Gigerenzer, 2000). Instead of engaging in a thorough evaluation of all available information, people base their judgments on attributes that are readily available and easy to evaluate while largely ignoring other crucial information. In most cases heuristics work quite well and result in accurate judgments; however, they can also produce errors and lead to misperceptions (Tversky & Kahneman, 1974). People apply heuristics for different decision domains, including judgments related to energy consumption (e.g., Kempton & Montgomery, 1982). Studies, for example, showed that people assess energy consumption of an appliance based on its size; the larger the appliance, the more energy it is assumed to consume (Baird & Brier, 1981; Schuitema & Steg, 2005). Given that energy conservation is a quite often discussed topic and is subject to strong social norms, there exists common sense about which behavior is symbolic for energy friendliness (e.g., driving a Toyota Prius) and which one is symbolic for energy unfriendliness (e.g., driving an SUV). Symbolic significant behavioral attributes are highly accessible. Therefore, they possibly serve as heuristic attributes that people rely on when making energy-related judgments. This might result in biased judgments.

The aim of the present paper is to provide evidence for people's reliance on symbolic significant behavioral attributes (hereafter called the symbolic significance heuristic) in judgments on energy consciousness and to illustrate its resulting effect on judgment accuracy. Furthermore, it aims to demonstrate the stability of this effect based on the findings of various tests that were conducted and to provide support for the postulated mechanism underlying the symbolic significance heuristic. The paper concludes with a discussion of the implications of the findings with regard to the development of communication strategies.

1.1. The Symbolic Meaning of Energy-Consumption Behaviors

People perceive a person's behavior not simply as "ordinary" behavior, but also as an indirect statement about a person's values and convictions. Thus, a certain symbolic meaning is attributed to a specific behavior based on which individuals draw conclusions about a person's personality characteristics. Following the approach of "symbolic interactionism" (Blumer, 1969; Mead, 1934), those general symbolic meanings are negotiated and constructed through the social context of interaction (i.e., conversation), and are constantly redefined and renegotiated (for an overview, see Charon, 2007; Jackson, 2005). Applied to the subject of energy consumption, this means in particular that the social context defines which behavior is symbolic for energy friendliness and which one is symbolic for energy unfriendliness. This process goes along with the collective definition of normative expectations on how an energy-friendly consumer is supposed to behave. As such, the symbolic meanings people assign to behaviors or objects are constantly renegotiated and redefined in the course of social interactions to fit with current social norms. Research shows that salient social norms in general exert a considerable influence on people's conservation efforts since people strive to be conform with social norms (Schultz, et al., 2007). Applying the approach of symbolic interactionism on pro-environmental behavior, Nye and Hargreaves (2010), for example, demonstrated the process of how communities (EcoTeams and Environment Champions) negotiated and defined new normative expectations through social interactions. The symbolic meaning of a behavior is socially constructed and is generally agreed upon and shared

amongst people as such (for an overview, see Charon, 2007). Engaging in a specific behavior, a person is automatically associated with the symbolic meaning of the behavior, which consequently serves as the basis for drawing inferences about a person's image and personality. Thereby, people's evaluation of a person, such as whether someone cares for the environment or not, is facilitated (Petkus, 1992).

The media plays a decisive role in the formation of symbolic meaning. For example, advertising represents a valuable means to communicate symbolic meaning (McCracken, 1986; Ottman, Stafford, & Hartman, 2006), since advertising can be considered as displaying versions of social life that are perceived as normative and ideal (Goffman, 1979). In the case of information or marketing campaigns capturing the issue of energy conservation, this means that desirable energy-saving consumption behaviors are communicated, and consequently, a symbolic meaning of energy friendliness is attributed to them. The same holds true for the identification and definition of behaviors that contradict normative expectation since they involve high energy consumption, and thus a symbolic meaning of energy unfriendliness is attributed to them. Relating the symbolic interactions perspective to research on environmentally responsible consumption, also Petkus (1992) highlighted the role of news media coverage, advertising, and product labeling for identifying the positive or negative potential environmental impact of products. According to Petkus (1992), these products and use behaviors, consequently, function as symbols for environmental responsibility or irresponsibility.

Several studies provide evidence that symbolic meanings of behaviors and products represent signals of a consumer's personality traits (i.e., identity) to a social audience. Investigating the symbolic meaning attributed to driving a battery-powered electric vehicle, Skippon and Garwood (2011) found that a driver of a battery-powered electric vehicle was considered to be a person of high openness, high conscientiousness, and high agreeableness. Another study stressing the impact of symbolic significance of conservation behaviors is by Sadalla and Krull (1995); it compared various conservation and consumption behaviors with regard to ascribed identity, using clothesline versus mechanical dryer, using public transit (bus) versus private automobile, and recycling. Findings indicated high consensus among participants regarding the symbolic significance of the examined behaviors. When asked to rate appropriateness of the behaviors for communicating interest in conservation, using the clothesline was perceived as more appropriate than using the dryer, taking the bus was rated more appropriate than driving a car, and recycling was considered appropriate to communicate interest in conservation. On the other hand, results suggested that engagement in conservation behavior has a rather negative effect on other identity attributions, such as status. A person engaging in conservation behavior was ascribed a lower status. However, latter findings were challenged by a study by Welte and Anastasio (2010), which postulated that these assertions no longer hold for today's society, since people's growing awareness of environmental problems and the human contribution to them might truly have changed people's attitude towards pro-environmental behavior. In line with their assumption, analyses revealed no significant differences in ascribed status between persons that differ in their level of conservation. Further support for the assumption that a symbolic meaning regarding environmental friendliness is attributed to products and related behaviors stems from a study by Heffner, Kurani, and Turrentine (2007), which found that people perceive that purchasing hybrid electric vehicles symbolizes environmental friendliness and purchasing SUVs symbolizes wastefulness. Also Turrentine and Kurani (2007) pointed to the importance of the symbolic meaning assigned to automotive fuel economy. Given that there exists high consensus on the symbolic meaning of pro-environmental behavior, and given that the communication of identity (i.e., the self-presentational goal) represents a strong motivator for human behavior (e.g., Baumeister, 1982), besides functional and affective motives, also symbolic motives (such as expression of personal identity and values) may constitute an important behavioral driver (Morton, et al., 2011). In this vein, Heffner and colleagues (2007) also provided evidence that people consider the purchase of a hybrid electric vehicle as a means to construct and communicate their personality through this widely recognized environmental symbol.

As demonstrated in the study of Sadalla and Krull (1995), people consider conservation actions appropriate to a different degree for the communication of an interest in conservation, meaning that conservation behaviors differ in their symbolic significance. This could be due to differences in discussion frequency and intensity of the various energy-related behaviors, for example, due to differing media and information program coverage (Sadalla & Krull, 1995). Thus, conservation behaviors are discussed in social interactions to various degrees; therefore, they establish symbolic significances of differing degrees. Certain behaviors, such as owning an energy-efficient car, are probably more prominent and are more often negotiated in social context than behaviors, such as covering a small annual distance by car. This results in the formation of a strong symbolic meaning of behaviors, which are often discussed in social interactions, whereas less prominent behaviors are perceived as less symbolic.

Summing up, we postulate that in the course of social interaction, a symbolic meaning is attributed to energy conservation and consumption behaviors, and that this symbolic meaning constitutes the basis of information interpretation and drawing inferences about a person's personality, such as about his or her energy consciousness.

1.2. Heuristics and Attribute Substitution

In everyday life, people are confronted with various cognitively demanding decision situations with different alternatives entailing several informational attributes. As people have only limited capabilities to undergo an extensive processing of all the information and aim to arrive at a decision in an efficient, time-saving way, they rely on heuristics (for a review, see Gigerenzer & Gaissmaier, 2011). In most cases the use of heuristics results in judgments that are of sufficient accuracy; however, in certain decision contexts, reliance on heuristics may lead to misjudgments (Tversky & Kahneman, 1974). When it comes to estimating energy consumption associated with certain behaviors or estimating the energy saved by certain conservation measures, people are generally subject to various misperceptions and misjudgments (e.g., Attari, et al., 2010). These misperceptions may partially be due to people's reliance on heuristics when evaluating energy consumption. People assess energy consumption related to a specific consumption behavior, for example, on the basis of the visibility of energy consumption or the running time of appliances (Kempton, et al., 1984; Kempton & Montgomery, 1982). It was shown, for example, that due to the visibility of energy consumption in the form of light, energy consumed by lighting is generally overestimated.

As suggested by Kahneman and Frederick (2002), a general feature of heuristic judgments is attribute substitution. They argue that a judgment is mediated by a heuristic whenever the attribute of the object a person wants to judge (target attribute) is not readily accessible, and a person assesses this target attribute by substituting a semantically and associatively related property that comes easier to mind (heuristic attribute). Since the substituted heuristic attribute differs from the target attribute, systematic biases, such as weighting biases, are inevitably introduced. Weighting bias describes people's tendency to attribute either too much or too little weight to cues that are available to judge, which consequently results in neglecting or underweighting of information that would be capable of supplementing or correcting the heuristic.

1.3. The Symbolic Significance Heuristic

Sometimes more than one potential heuristic attribute is available, and it seems reasonable to assume that in such situations, the attribute with higher accessibility at that point of time is chosen as the heuristic attribute. However, we would argue that for certain judgmental issues, it is not a matter of current strength of accessibility, but that the symbolic significance of an attribute is decisive. Let us imagine a judgment situation in which it comes to rating energy consciousness of a person described by two inherently contradictory attributes – one generally representing energy consciousness, such as driving an energy-friendly car, and

one generally representing energy unconsciousness, such as covering large distances by car. Which attribute serves as the heuristic attribute that is substituted for the rating of energy consciousness (the target attribute)? The rationale of the prototype heuristic, assuming that a property of the prototype represents the heuristic attribute (Kahneman, 2003), does not seem to hold for such a judgment situation entailing two potential heuristic attributes reflecting prototype properties that are contradictory in nature – in the sense that they conform to conflicting prototypes. Confronted with a somewhat more value-laden decision situation incorporating such contradictory attributes, we do not suggest that people solely use the attribute that is currently more accessible as the heuristic attribute due to recent evocation or priming (Bargh, Bond, Lombardi, & Tota, 1986), but that they choose the one with the higher symbolic significance. In the case of our car-driver example, this means that people unconsciously base their judgment on information about energy friendliness of the car (i.e., the car type), which is perceived as symbolic of energy consciousness as a result of existing social norms and communication through advertisement and marketing campaigns. In line with the weighting bias, the symbolic significant attributes that are primarily focused on are overweighted, whereas less symbolic significant attributes, such as covered distance (that also provide crucial information for estimation of energy consumption), are largely neglected and thus underweighted. This neglect of potentially correcting information may result in an inadequate judgment. This is especially true when, as in this case, the less symbolic significant attribute and the symbolic significant attribute are of opposing value – large covered distance (negative value) versus energy friendly car (positive value) or vice versa, short distance covered (positive value) versus energy unfriendly car (negative value) – and thus, the effect of the symbolic significant attribute should actually be relativized.

A factor that probably underlies or fosters the symbolic significance bias (the tendency to focus on symbolic significant attributes and base judgments primarily on this information while neglecting less symbolic) is the manner in which people attribute inconsistent behavior. People may embark on different strategies to respond to inconsistent information (Vonk, 1994). Having already formed a first impression based on a symbolic significant attribute, when considering another behavioral attribute of opposing value, people could ascribe this inconsistent behavior to external factors; that is, they could make inferences about the situational context underlying the contradictory behavior (e.g., Kulik, 1983). Thus, the inconsistent behavior is not attributed to the agent's personality, and no conflict arises. Considering the example with the person who drives an energy friendly car but covers long distances, people could argue that a longer driving distance could be due to the fact that a person lives somewhere distant; thus the person is dependent on the car and has to use it more often and for longer distances. Another possibility is that people question a person's intention underlying the inconsistent behavior (e.g., Jones & Davis, 1965). Intentions associated with a behavior influence the evaluation of the behavior as a whole. In a trial, for example, it makes a huge difference whether there was an intention to kill a person or not, even if the outcome is the same. Intentions ascribed to a person can be as important as the actual behavior shown. Symbolic significant behaviors are more prominent in judgments on personality and can be considered as being of high diagnosticity regarding the underlying motivation. Thus, an intention can be more readily assumed to underlie this behavior. This attributional process could be further enforced by people's tendency to automatically judge a behavior as intentional (Rosset, 2008). Buying an energy-friendly car, for example, is a symbolic significant behavior that demonstrates good intentions. People may infer from such a purchase decision that the buyer of the car has the intention to reduce fuel consumption and to reduce emissions that cause climate change, and that he or she, consequently, is environmentally friendly. Less symbolic significant behaviors, such as the distance a person covers by car, might be perceived as more ambiguous with regard to underlying behavioral causes and, therefore, seem more ambiguous with regard to the motives driving the behavior. As such, less symbolic behaviors may be less useful for deducing a person's intentions and making inferences on personality. The importance of perceived motives in ascription of intention was also demonstrated in a recent study by Monroe and Reeder (2011), which showed that perceived intentionality of an action may be reduced when there is an incongruence between an agent's actual behavior and the motives assumed to drive the behavior. This approach could also provide a possible explanatory framework to a certain extent for the mechanisms under-

lying the symbolic significance bias. Considering symbolic significant behavioral information, people could automatically assume a certain motive driving the behavior, which they could consequently find to be challenged by a less symbolic behavior of opposing value. The resulting incongruence between perceived motives and behavior could give rise to a reduction in perceived intentionality, which is also in line with other research showing that people respond to inconsistent behavior by automatically classifying it as being of a non-intentional nature (e.g., Jones & Davis, 1965). Thus, the behavior is not ascribed to agents' personality. As a result, when judging parts of persons' personality, such as their energy consciousness, symbolic significant behaviors are mainly relied on.

In both cases of attributional responses to inconsistent behaviors – attributing it to situational causes and questioning the intention underlying it – the trait implications of the inconsistent (i.e., less symbolic significant) behaviors are discounted. As a consequence, these behaviors are largely neglected when making inferences on a person's personality, such as a person's energy friendliness, while symbolic significant ones are preferentially focused on and overweighted. Why is such a wrong assessment problematic? People may show symbolic behavior that demonstrates their good behavioral intentions instead of changing their actual energy consumption behavior, which also requires consideration of less symbolic behaviors.

Besides heuristics and biases dealing with the issue of facts, focusing on the understanding of probability, risk, or quantity, fast and frugal decision rules for social and moral judgments also exist (Cosmides & Tooby, 2006), such as moral heuristics (Sunstein, 2005). In contrast to moral heuristics, the symbolic significance heuristic, in line with the classic work on heuristics and biases (Sunstein, 2005), deals with issues of facts; that is, the error introduced by the application of the heuristic is highly intuitive but uncontroversial on reflection. However, they both stress the importance of the social environment, but they look at different aspects. For heuristics on moral behavior, social environment is considered from the point of view that these heuristics incorporate general principles that coordinate human groups (Gigerenzer, 2010) and motivate cooperation and sharing (Cosmides & Tooby, 2006). For the heuristic of symbolic significance, however, the social environment (in terms of social interaction) merely constitutes the source where symbolic meaning of behaviors is generated, which consequently serves as the basis for the heuristic.

Based on the above reasoning, we postulate that people, when confronted with a value-laden decision, apply a certain heuristic, which shall be called the symbolic significance heuristic. In line with this heuristic, we hypothesize that in judgment situations in which a consumer behavior that is more dictated by social norms and conventions, such as energy consumption behavior, is evaluated and is described by attributes that are representative for opposing prototypes, people rely on the attribute that is commonly perceived as more symbolic significant. Consequently, if a person is described by a symbolic significant attribute that has a positive value with regard to energy consumption, the person is automatically considered energy conscious, whereas if the symbolic significant attribute has a negative value, the person is considered energy unconscious. Less symbolic significant attributes (hereafter called symbolic neutral attributes) included in the characterization of a person, even if they are of opposing value, are largely neglected. This finally results in misperceptions, as it precludes an adequate estimation of energy consumption, and – in the case of an opposing value of the symbolic neutral attribute – prevents the necessary relativization of the symbolic significant attribute. As a consequence, the energy consciousness of a person showing a positive symbolic significant behavior is generally overestimated, and the energy consciousness of a person showing a negative symbolic significant behavior is generally underestimated.

2. Study 1: Energy Consciousness Judgments for Different Domains

The symbolic significance heuristic is expected to be applied in judgment situations that are related to energy friendliness and that comprise description attributes of a symbolic nature. Energy consumption is indirectly or directly involved in various actions of people's everyday lives related to different consumption domains, such as mobility, housing, and food. Consequently, besides providing evidence for the use of the symbolic significance heuristic in general, a first aim of Study 1 was to consider different energy-related behavioral domains, thereby also testing for the generalizability of the symbolic significance heuristic.

However, even if the expected findings emerge, it sill could be argued that the misjudgment resulting from the focus on only one specific attribute is not due to the symbolic significant nature of this attribute, but due to its ease of evaluation compared to the other attribute. From the viewpoint of the evaluability hypothesis of Hsee (1996), it could be assumed that the misjudgment occurs because one attribute, the symbolic neutral, is hard to evaluate independently (e.g., distance to work), while the other one, the symbolic significant, is quite easy to evaluate independently (e.g., type of commuting vehicle). According to Hsee (1996), an attribute is hard to evaluate independently when an evaluator has no idea how good a given value on this attribute is without having the possibility of comparison. Yet, provided with the possibility of comparing an option with another one, the evaluability of the eventually hard-to-evaluate attributes is increased, and, as a result, they are more likely to be considered in the decision situation. To rule out this alternative explanation, a second aim of Study 1 was to provide evidence that the effect of the symbolic significance fallacy persists, even if individuals are presented with two descriptions simultaneously, both including low and high symbolic significant behavioral attributes but of opposing values, thus allowing a direct comparison of the descriptions attributes and thereby increasing their evaluability.

2.1. Method

2.1.1. Participants

A total of 282 persons was invited to participate in an online study. These persons were members of an online panel who agreed to participate in online studies for the period of half a year with a time interval of two months from one study to the next one. Data collection lasted from February 18 to March 3, 2011. Of the 282 persons receiving an invitation for the online study, 246 participated. The sample consisted of 95 (38.6%) women and 151 (61.4%) men, and the average age was 54 years (*SD* = 14). Participants ranged in age between 18 and 87 years.

2.1.2. Materials and Procedure

Descriptions of two energy consumers were generated for four different energy consumption scenarios: commuting, car driving, room heating, and meat consumption, resulting in a total of eight energy consumer descriptions (see Table 4.1). For each scenario, the two energy consumers were described based on two attributes, one reflecting a behavior of high symbolic significance, that is, an attribute that is commonly perceived as standing for energy friendliness or energy unfriendliness (e.g., driving an energy-friendly car), and one reflecting a behavior of rather symbolic neutral nature (e.g., covering only a short distance with the car per year). If one of the two attributes was positive in value, the other one was negative and vice versa. Consequently, one energy consumer was characterized by a positive symbolic significant behavioral attribute (e.g., energy-friendly car) and a negative symbolic neutral behavioral attribute (e.g., long distance), whereas the other energy consumer was described by a negative symbolic significant behavioral attribute (e.g., energy-unfriendly car) and a positive symbolic neutral behavioral attribute (e.g., short distance). The two energy consumer descriptions were constructed in such a way that the consumer with the positive symbolic significant behavior overall, that is, considering both attributes, consumed more energy than the

energy consumer with the negative symbolic significant behavior. For example, Mr. Meier, even though he drives an energy-friendly car (Prius), consumes more energy (i.e., fuel) than Mr. Huber, who drives an energy-unfriendly vehicle (SUV). Mr. Meier uses more energy because the distance he covers per year is rather long. These two energy consumer description conditions (positive symbolic significant behavior versus negative symbolic significant behavior) constituted the factor value of symbolic significant behavior.

Table 4.1. **Energy Consumption Scenarios and Energy Consumer Descriptions with Value of Symbolic Significant and Symbolic Neutral Behaviors and Indication of Actual Energy / Environmental Consciousness**

Energy consumption scenario	Energy consumer	Behavioral attribute				Actual consciousness
		Symbolic significant		Symbolic neutral		
Commuting	Mr. Müller	Train	+	Distance 100 km	–	Energy consciousness ↓
	Mr. Egger	Car (Golf)	–	Distance 3 km	+	Energy consciousness ↑
Car driving[1]	Mr. Meier	Prius, energy label A	+	28,700 km a year	–	Energy consciousness ↓
	Mr. Huber	SUV, energy label C	–	11,400 km a year	+	Energy consciousness ↑
Room heating[2]	Mrs. Suter	Temperature 18 °C	+	Living space 205 m^2	–	Energy consciousness ↓
	Mrs. Nägeli	Temperature 22 °C	–	Living space 120 m^2	+	Energy consciousness ↑
Meat consumption[3]	Mrs. Rohner	2x a week	+	Swiss beef	–	Environmental consciousness ↓
	Mrs. Widmer	4x a week	–	Swiss chicken	+	Environmental consciousness ↑

Note. The value of the attributes (symbolic significant/symbolic neutral) is indicated by a respective plus or minus sign. [1] As probably not all participants have an idea what a Prius or an SUV is, in addition to the description, a picture of the specific car was shown. [2] In the descriptions it was indicated that the house owner lives alone to prevent participants from making any assumptions about the number of household members based on the size of the living space. [3] Participants were asked to rate environmental consciousness. To deter participants from making any assumptions about the number of meat consumers in the household, the descriptions included a notion that the person is single and cooks for herself. As a basis for calculation of the amount of meat consumed, a portion size of 150 g of meat per meal was presumed. For the calculation of the energy consumption and the consequent construction of the energy consumer descriptions, we relied on different information sources: Information related to the energy consumption of the different commuting alternatives were drawn from the background report "Umweltfahrplan SBB" of the Swiss railway operator (Tuchschmid, 2010), which was consulted for information on energy consumption per passenger-kilometer of an express train given a high train utilization (i.e., 100% of the seats occupied); for the calculation of energy consumption of the car, commuter average fuel consumption of a middle class car, that is, 8 l/100 km (userlearn), was used; for information about fuel consumption of the various car types, the motor vehicle list of the Swiss Federal Office of Energy SFOE was consulted (BFE); for the calculation of the energy consumption of space heating based on the factors room temperature and living space, we used the online calculator "ECO2-Rechner" (EcoSpeed); and for the construction of the meat consumer scenario, we relied on information on ecofactor derived from the teaching material of the Federal Office for the Environment FOEN (Ahmadi, 2009) that relied on the Swiss method "Ecological Scarcity" (UBP 06–Umweltbelastungspunkte 06 [eco-points 06]).

At the beginning of the study, participants read a short introductory text describing the issue of the study and ensuring absolute anonymity. After answering some questions about sociodemographics, participants proceeded to the actual experiment. They were presented with descriptions of energy consumers of the four different energy consumption scenarios. After each energy consumer description, participants were asked to rate energy consciousness of the respective energy consumer on a scale ranging from 1 (*not at all energy conscious*) to 6 (*very energy conscious*), representing the dependent variable. The question was phrased as follows: "How energy conscious do you consider XY?" For the meat consumption scenario, the question was differently formulated. In this scenario, we asked for a judgment of consumers' environmental consciousness: "How environmentally conscious do you consider XY?" Analogous to the other scenarios, participants were asked to rate energy conscious-

ness on a scale ranging from 1 (*not at all environmentally conscious*) to 6 (*very environmentally conscious*). The material used in the study with the exact wording of the descriptions is depicted in Appendix C. At the end of the study, participants were thanked for their contribution. In return for their participation, participants received a short report summing up the aim of the study and the findings.

One-third of the participants were assigned to the condition in which both energy consumer descriptions were presented, and two-thirds were assigned to the condition in which only one energy consumer description was presented. This procedure resulted in about an equal number of energy-consciousness ratings for energy consumers with a positive symbolic significant behavior and for consumers with a negative symbolic significant behavior in the two presentation conditions. A random trigger made sure that participants were randomly assigned to one of the two presentation conditions by "throwing" a number between 1 and 3. If the number was 1, participants were assigned to the condition in which they were presented with both energy consumer descriptions, and if the number was 2 or 3, participants were assigned to the condition in which only one energy consumer was presented. However, to assure that the distribution of the participants to the two conditions comes as near as possible to the desired proportion (1/3 to 2/3), it was additionally defined that the trigger should strive for an equal distribution regarding the thrown numbers 1 to 3.

The condition in which participants were presented with both energy consumer descriptions for each energy consumption scenario constituted a within-subjects design, since participants rated both energy consumers for each energy consumption scenario. In this experimental condition, participants were provided with the opportunity to directly compare the two energy consumers regarding their values of the two description attributes when rating their energy consciousness, thereby increasing evaluability of the attributes. To allow a direct comparison of the two energy consumer descriptions, both were depicted on one page, one below the other. Furthermore, to avoid order effects regarding the different energy consumption scenarios, the scenarios were randomly rotated with respect to presentation sequence. To correct for possible order effects related to the position where the energy consumer with the positive or negative symbolic significant behavior was presented, the energy consumer with the positive symbolic significant behavior was positioned first (car driving and meat consumption) in half of the energy consumption scenarios, and the energy consumer with the negative symbolic significant behavior was presented first (commuting and room heating) in the other half.

The presentation condition in which participants were only presented with one energy consumer description for each energy-consumption scenario constituted a between-subjects design. To control for possible order effects, the different energy-consumption scenarios were randomly rotated. For each energy-consumption scenario, it was randomly determined whether participants saw the consumer with the positive or the negative symbolic significant behavior; random triggers striving for an equal distribution to the two conditions were used.

2.2. Results

The two comparability conditions (between-subjects vs. within-subjects design) and the four different energy-consumption scenarios were separately analyzed using t-tests. In the condition in which participants were presented with only one energy consumer description (between-subjects design), the different energy consumption scenarios were analyzed conducting independent t-tests, with the value of the symbolic significant behavior (positive or negative) as the independent variable and the energy- and environmental-consciousness ratings as the dependent variable. Results revealed that energy- and environmental-consciousness ratings of participants judging the consumer showing a positive symbolic significant behavior and a negative symbolic neutral behavior were significantly higher than ratings of participants estimating energy- and environmental-consciousness of the consumer

with the negative symbolic significant behavior and the positive symbolic neutral behavior. This effect emerged across all energy-consumption scenarios (see Table 4.2).

In a next step, we analyzed the presentation condition in which comparability between the two energy consumer descriptions was given (within-subjects design). Energy-consumer scenarios in this condition were analyzed by means of dependent t-tests, with the value of the symbolic significant behavior (positive versus negative) as the independent variable and energy- and environmental-consciousness ratings as the dependent variable. In line with our assumption, participants rated the energy consumer who was characterized by a positive symbolic significant behavior and a negative symbolic neutral behavior as more energy or environmentally conscious than the consumer who was described by a negative symbolic significant behavior and a positive symbolic neutral behavior. This was true for both comparability conditions and for all four energy-consumption scenarios (see Table 4.2).

Table 4.2. **Energy- and Environmental-Consciousness Ratings for Energy Consumers with Positive and Negative Symbolic Significant Behavior Differentiated According to Comparability Condition and Energy Consumption Scenario**

Comparability	Energy consumption scenario	Value of symbolic significant behavior				t-test result
		Positive		Negative		
		M (SD)	n	M (SD)	n	
No (between)	Commuting	4.56 (1.35)	82	2.11 (1.11)	82	$t(162) = 12.68$, $p < .001$, $d = 1.98$
	Car driving	4.52 (1.14)	82	2.05 (1.07)	82	$t(162) = 14.40$, $p < .001$, $d = 2.25$
	Room heating	4.54 (1.24)	82	2.62 (1.25)	82	$t(162) = 9.84$, $p < .001$, $d = 1.54$
	Meat consumption	4.10 (1.04)	82	3.78 (1.09)	82	$t(162) = 1.91$, $p = .029$[1], $d = 0.30$
Yes (within)	Commuting	4.35 (1.32)	82	1.95 (1.07)	82	$t(81) = 11.05$, $p < .001$, $d = 1.73$
	Car driving	4.37 (1.20)	82	2.22 (1.03)	82	$t(81) = 11.43$, $p < .001$, $d = 1.79$
	Room heating	4.11 (1.47)	82	2.49 (1.03)	82	$t(81) = 9.05$, $p < .001$, $d = 1.41$
	Meat consumption	3.71 (1.05)	82	3.18 (1.00)	82	$t(81) = 3.69$, $p < .001$, $d = 0.58$

Note. Means and standard deviations and results of t-tests are presented. [1] One-tailed p-value is indicated.

2.3. Discussion

The findings of Study 1 confirm our assumption that people rely mainly on symbolic significant behavioral attributes in their evaluation and judgment of a consumer's energy or environmental consciousness and tend to ignore or only insufficiently incorporate other crucial attributes in the decision-making process. The application of the symbolic significance heuristic is reflected in individuals' tendency to ascribe a higher energy consciousness to consumers with positive symbolic significant behavior than to consumers with a negative symbolic significant behavior, although considering all behavioral attributes, the opposite is the case. This response tendency was observed for different energy-related and environmental-related behaviors (commuting, car driving, room heating, and meat consumption) representing different consumption domains. The fact that the symbolic significance heuristic was demonstrated for different energy and environmental issues substantiates the generalizability of the symbolic significance heuristic.

Since the effect even persisted when participants were presented with both consumer descriptions, allowing a direct comparison of consumers' behavioral attributes, the alternative explanation regarding evaluability can be ruled out. Joint presentation of the two descriptions does not weaken the effect, meaning that the impact of the symbolic neutral (and thus probably harder to evaluate) attribute did not increase and did not result in a more adequate judgment as the evaluability hypothesis would have predicted. These results assuring that

the effect is not related to evaluability of the attributes further strengthen our assumption that people almost exclusively draw on symbolic significant behaviors when judging energy and environmental consciousness.

However, as the question asking participants to rate energy consciousness of the described person was formulated in general terms, it could be argued that participants were inclined to generalize from the described symbolic significant behavior to the person's consumption behavior in other domains. For example, participants could assume that a person owning an energy-friendly car also endeavors to behave in an energy-friendly and environmentally-friendly manner in other behavioral domains, for instance, by purchasing regional food, turning off lights in unused rooms, et cetera. Due to the general phrasing of the question, participants were possibly susceptible to generalizing from symbolic significant behavior to other consumption behaviors, and thus, to overall energy and environmental consciousness. Therefore, it cannot be conclusively stated that the focus on symbolic significant behavior results in a biased judgment; the described person's consumption behavior in other behavioral domains is unknown and participants' judgments cannot be 100% falsified. Nevertheless, findings suggest that people base their judgments about energy consciousness and environmental consciousness mainly on information representing symbolic significant behavior and widely neglect other behavioral characteristics.

3. Study 2: Ruling out Generalization as Alternative Explanation

Since in Study 1, the question was formulated in rather general terms, the question – whether individuals in fact inadequately rated energy consumption related to a specific scenario or whether they generalized from the symbolic behavior to other consumption behaviors – remains unanswered. A second study was conducted to counter objections that the misjudgments found in Study 1 were due to participants' tendency to automatically make generalizations about other energy-related behaviors of other behavioral domains and that their judgments cannot be considered entirely inadequate. The purpose underlying Study 2 was the replication of the results found in Study 1 using a more specific formulation of the dependent variable.

3.1. Method

3.1.1. Participants

Overall, 121 persons took part in the second online study. Participants represented a convenience sample, of which the main part was recruited from recipients of a mailing list in which mainly psychology students were enlisted. Data were collected from April 4 to April 15, 2011. The final sample consisted of 92 (76%) women and 29 (24%) men. The mean age was 28 (*SD* = 8), ranging between 19 and 64 years.

3.1.2. Materials and Procedure

As the effect of symbolic behavior was already demonstrated for various energy consumption domains, the second study restricted the scenarios to commuting and car driving. The material utilized was essentially the same as in the first study, with the difference that participants were specifically asked to rate a persons' energy consciousness with regard to the described behavior. The questions were formulated as follows: "How energy conscious do you consider XY with regard to his mobility behavior related to commuting to work?" and "How energy conscious do you consider XY with regard to his mobility behavior related to the car?" The response scale ranged from 1 (*not at all energy conscious*) to 6 (*very energy conscious*).

The process was basically the same as in the first study, with the exception that in the commuting scenario, participants were not provided with a possibility of comparison, since they were presented with only one commuter description (between-subjects design). Whereas in the car-driving scenario, which showed both car driver descriptions, participants were given the opportunity to compare (within-subjects design). This procedure allowed replicating the findings of the previous study concerning the two evaluability conditions. Participants were first presented with a commuter description. A random trigger made sure that participants were randomly assigned to the condition in which the commuter with the positive symbolic significant behavior (n = 61) or the negative symbolic significant behavior (n = 60) was presented. After rating the commuter's energy consciousness, participants proceeded to the next page, and they were presented with the descriptions of both the car driver with the positive symbolic significant behavior and the one with the negative symbolic significant behavior. The car drivers were positioned one upon the other. To avoid presentation order effects, the position of the car drivers was rotated, which was regulated by another random trigger. Random triggers were again defined to strive for an equal distribution.

3.2. Results

The first-presented scenario, the commuting scenario, was analyzed performing an independent t-test, with the value of the symbolic significant behavior (positive vs. negative) as the independent variable, and energy-consciousness rating as the dependent variable. In line with Study 1, analysis showed that energy consciousness regarding the mobility behavior related to commuting to work was rated significantly higher by participants judging the commuter with the positive symbolic significant behavior (train commuter) (M = 4.64, SD = 1.00) than by participants judging the commuter with the negative symbolic significant behavior (car commuter), (M = 1.92, SD = 0.77), $t(119) = 16.79$, $p < .001$, $d = 3.05$.

The car-driver scenario, representing a within-subjects design, was analyzed using a dependent t-test. Three participants terminated the online study after the commuting scenario and did not proceed to the next scenario, reducing the sample size to 118. The analysis revealed that participants rated the car driver with the positive symbolic significant behavior (Prius driver) with regard to his mobility behavior related to the car as significantly more energy conscious (M = 3.95, SD = 1.23) than the one with the negative symbolic significant behavior (SUV driver; M = 2.39, SD = 0.93), $t(117) = 12.99$, $p < .001$, $d = 1.69$.

3.3. Discussion

Results of the second study further support our hypothesis that people base their judgments concerning a person's energy consciousness on symbolic significant behavioral attributes. Replicating the findings of the first study, participants considered the person engaging in a positive symbolic significant but negative symbolic neutral behavior as more energy conscious than the one showing a negative symbolic significant but positive symbolic neutral behavior – even though considering all characteristics, the latter actually consumed less energy. Consistent with the results of the previous study, the effect was significant regardless of whether participants were presented with both descriptions or only with one description. Moreover, since in this study participants were asked to specifically rate energy consciousness with regard to the described mobility behavior and the effect could still be demonstrated, the alternative explanation that the effect is due to generalization to other energy-related behaviors can no longer be maintained.

However, it still could be argued that people assume a different purpose that underlies the energy use behaviors of the two different energy consumers. For example, people could automatically presume that the longer distance covered by the car driver with the energy-friendly car is due to the fact that he lives in a remote place with an inadequate connection to

public transport, and therefore, he is urged to use the car and drive longer distances. This issue was considered in the next study.

After providing strong evidence for the effect of reliance on symbolic significant behavior by replicating the findings of Study 1 and eliminating alternative explanations concerning evaluability and potential generalization, a further question addressed in the next step is how stable this effect actually is. More precisely, it addresses whether the effect persists if the experiment is designed in such a way that the focus is shifted more on overall energy consumption associated with the specific mobility behavior, meaning on all related information needed to calculate or adequately estimate total energy consumption.

4. Study 3: Detailed Information on Vehicle's Energy Consumption

In the two previous studies, participants were presented with descriptions of energy consumers as they may be faced in everyday life. Often, information on distance covered and type of car is the only information available, which people extract from discussions and observations. This information serves as a basis for estimations about the respective car driver's energy consciousness. Specific indications on energy consumption of the vehicle (l/100 km) are rarely available and probably are in most cases estimated based on experiences and by means of comparisons with other vehicles. Provision of specific information on the vehicle's energy consumption could foster a thorough consideration of all the information available, as it could motivate a detailed calculation of total energy consumption of the described scenario or at least shift the focus more toward hitherto largely ignored characteristics. This could consequently lead to a more adequate judgment. By providing detailed information on the vehicle's energy consumption, the last element of uncertainty is eliminated because no more estimation is necessary to calculate total energy consumption. Thus, all participants possessing basic computation skills are equally capable of adequately calculating total energy consumption.

Individuals tend to automatically draw inferences from behaviors to possible underlying reasons or to automatically make generalizations. This could especially be true when a symbolic significant behavior is involved and when individuals try to accommodate another rather contradictory behavior with this symbolic significant behavior. For example, owning an energy-friendly car, which stands for energy consciousness, is incompatible with covering large distances by car, which is a rather energy unconscious behavior; thus, people might automatically assume that a car driver who owns an energy-friendly car but covers large distances lives somewhere distant and is forced to use the car. To prevent participants from automatically drawing conclusions about the reasons underlying a certain behavior that could possibly result in a biased or unequal consideration of certain attributes, it is essential that participants assume identical purposes underlying the described behaviors. The necessity of causal clarity was also emphasized by Morris and Larrick (1995), who pointed to the fact that a behavior that could be attributed to various reasons is perceived as non-representative and therefore non-diagnostic for inference of attitude.

Summing up, the aim of Study 3 was to test for the stability of the effect of symbolic significant behavior by designing the judgment situation more stringently in providing participants with all the information necessary to calculate total energy consumption and preventing them from drawing any misleading assumption regarding the reasons underlying a specific behavior.

4.1. Method

4.1.1. Participants

We recruited people from the online panel who had not been invited to take part in the first study and therefore were unfamiliar with the study subject. Of the 277 members of the online panel receiving an invitation to participate in the study, 243 responded, of whom 91 (37.4%) were female and 152 (62.6%) were male. Average age was 53 (*SD* = 14) and age ranged between 23 and 87 years. Data collection lasted from April 21 to May 11, 2011.

4.1.2. Materials and Procedure

As in Study 2, we used the commuting and the car-driving scenarios, which were subjected to small changes. First of all, to assure that participants did not automatically draw conclusions about differing purposes or situational circumstances underlying the consumption behavior of the different energy consumers or that they make generalizations, more context information was provided, assuring that participants assume identical purposes and situational circumstances underlying energy consumers' behavior. In the case of the commuting scenario, participants could, for example, assume that the train commuter is also more likely to use the train on other occasions, such as for going on holidays, and thus is very energy conscious. To prevent participants from making such misleading assumptions, context information was added restricting the use purpose of the mentioned means of transportation to commuting by stating that the ride to work was the only longer distance covered. To examine the effect of the provision of detailed information on energy consumption, the study consisted of two experimental conditions. For the condition in which detailed information about energy consumption of the vehicle used was provided, the energy consumer descriptions (in this case the commuter descriptions) entailed indications on how much fuel the specific vehicle consumed per 100 km (per passenger). The description of the train commuter required some minor modification. As all fuel consumption indications were given for 100 km, the distance covered by train was raised from 100 km, as it was in the two preceding studies, to 120 km in order to assure that for each energy consumer description, participants had to make about an equal step of calculation to get the overall fuel consumption. The detailed commuter descriptions used in the present study are provided in Table 4.3.

In the car driving-scenario, we also aimed to rule out the possibility that participants base their judgment on misleading conclusions, such as that the car driver with the energy-friendly car might live in a remote place with inadequate connections to public transport and therefore is forced to take the car more often and covers longer distances, for example, to commute to work. Since this situation could be considered as unchangeable, the Prius driver could still be perceived as energy conscious since he drives an energy-friendly car. To eliminate potential impairing effects on participants' judgments resulting from such deceptive assumptions regarding underlying use purposes, a note was added in the descriptions of the car drivers that explained that the car was only used in leisure time. For the condition in which detailed information on energy consumption of the car was provided, the energy consumer descriptions additionally entailed information on how much fuel the specific car consumed per 100 km. The detailed energy consumer descriptions of the car-driving scenario are depicted in Table 4.4.

A between-subjects design was used; participants were either presented with the energy consumer description with the positive or the negative symbolic significant behavior. In everyday life, situations in which people rate energy consciousness of a person individually are more likely than situations in which people judge two persons regarding their energy consciousness, probably making use of the opportunity to compare them. Summing up, two factors were manipulated: the value of the energy consumer's symbolic significant behavior (positive vs. negative) and provision of detailed information (detailed information on vehicle's fuel consumption vs. no detailed information). Both factors were between-subjects factors. The combination of these two factors resulted in four different energy consumer descriptions

for each energy consumption scenario (cf. Table 4.3 and Table 4.4). Each participant was presented with one commuter and one car driver description. Thereby, the study was designed in a way that participants were always presented with descriptions of the two scenarios that were reversed in their characteristics of the two manipulated factors. For example, participants presented with the description of the commuter with the positive symbolic significant behavior (train commuter) entailing detailed information on the vehicle's fuel consumption, were additionally shown the description of the car driver with the negative symbolic significant behavior (SUV) without detailed information on vehicle's fuel consumption. Thus, there were four combinations of descriptions of the two scenarios.

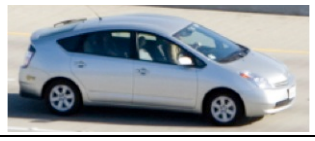
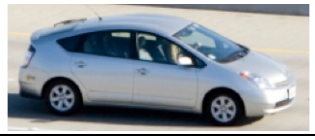
Table 4.3. **Descriptions Used for the Commuting Scenario: Energy Consumers with Positive and Negative Symbolic Significant Behavior for the Conditions with and without Detailed Information on Fuel Consumption**

Value of symbolic significant behavior	Information on fuel consumption	Description
Positive: Train commuter	No	Mr. Müller lives 120 km from his place of work. He commutes every day by express train to work. The ride to work is the only longer distance Mr. Müller covers. Otherwise, he spends his leisure time preferably near to his place of residence.
	Yes	Mr. Müller lives 120 km from his place of work. He commutes every day by express train, for which the energy consumption per passenger is equivalent of 0.25 l/100 km, to work. The ride to work is the only longer distance Mr. Müller covers. Otherwise, he spends his leisure time preferably near to his place of residence.
Negative: Car commuter	No	Mr. Egger lives 3 km from his place of work. He commutes every day with his car, a VW Golf label D with a 1.6 l engine, to work. The ride to work is the only longer distance Mr. Egger covers. Otherwise, he spends his leisure time preferably near to his place of residence.
	Yes	Mr. Egger lives 3 km from his place of work. He commutes every day with his car, a VW Golf label D with a 1.6 l engine, with a fuel consumption of 8 l/100 km, to work. The ride to work is the only longer distance Mr. Egger covers. Otherwise, he spends his leisure time preferably near to his place of residence.

Note. Energy consumer descriptions were preceded by the introductory text: "In the following you are presented with an employee." Participants were asked to indicate how energy conscious they consider the described person with regard to his mobility behavior related to commuting to work. The scale ranged from 1 (*not at all energy conscious)* to 6 (*very energy conscious*).

The procedure was identical to that of the second study, except that this time, participants were presented with only one energy consumer description of each scenario. After each description, participants were prompted to rate energy consciousness of the respective energy consumer specifically with regard to the described mobility behavior on a scale ranging from 1 (*not at all energy conscious*) to 6 (*very energy conscious*) asking "How energy conscious do you consider XY with regard to his mobility behavior related to commuting to work?" and "How energy conscious do you consider XY with regard to his mobility behavior related to the car?" To correct for possible order effects related to the presentation position of the two different consumption scenarios (commuting vs. car-driving scenario), the four combinations of descriptions of the two energy-consumption scenarios (cf. description above) were presented once starting with the commuting and once starting with the car-driving scenario. Consequently, participants were assigned to eight different conditions of commuter and car driver descriptions. Which condition participants were presented with was determined by a random trigger, programmed to strive for an equal distribution.

Table 4.4. **Descriptions Used for the Car-Driving Scenario: Energy Consumers with Positive and Negative Symbolic Significant Behavior for the Conditions with and without Detailed Information on Fuel Consumption**

Value of symbolic significant behavior	Information on fuel consumption	Description
Positive: Prius driver	No	Mr. Meier drives a Toyota Prius with energy label A with hybrid drive (see picture). Mr. Meier lives in the city and spends his leisure time preferably in nature, in the mountains. In his leisure time, he covers a distance of 28,700 km with his car per year. He uses his car only in his leisure time. 
	Yes	Mr. Meier drives a Toyota Prius with energy label A with hybrid drive with a fuel consumption of 3.9 l/100 km (see picture). Mr. Meier lives in the city and spends his leisure time preferably in nature, in the mountains. In his leisure time, he covers a distance of 28,700 km with his car per year. He uses his car only in his leisure time. 
Negative: SUV driver	No	Mr. Huber drives an SUV (sport utility vehicle) with energy label C (see picture). Mr. Huber lives in the city and spends his leisure time preferably in nature, in the mountains. In his leisure time, he covers a distance of 11,400 km with his car per year. He uses his car only in his leisure time. 
	Yes	Mr. Huber drives an SUV (sport utility vehicle) with energy label C with a fuel consumption of 8.4 l/100 km (see picture). Mr. Huber lives in the city and spends his leisure time preferably in nature, in the mountains. In his leisure time, he covers a distance of 11,400 km with his car per year. He uses his car only in his leisure time. 

Note. Energy consumer descriptions were preceded by the introductory text: "In the following you are presented with a car driver who has recently purchased a new car." Participants were asked to indicate how energy conscious they consider the described person with regard to his mobility behavior related to the car. The scale ranged from 1 (*not at all energy conscious*) to 6 (*very energy conscious*).

4.2. Results

Data for the two energy consumption scenarios and the two information provision conditions were analyzed separately conducting independent t-tests, with the value of the symbolic significant behavior (positive vs. negative) as the independent variable, and the energy-consciousness rating as the dependent variable. We first have a look at the results of the commuting scenario. Replicating the findings of Study 2, when no detailed information on fuel consumption of the vehicle was provided, the commuter with the positive symbolic significant behavior (train commuter) was rated significantly more energy conscious regarding his

mobility behavior related to commuting to work than the commuter with the negative symbolic significant behavior (car commuter). The same holds true for the comparison of the two commuter descriptions that entailed detailed information on fuel consumption. The commuter with the positive symbolic significant behavior is still considered more energy conscious than the one with the negative symbolic significant behavior. Results of the conducted t-tests and corresponding means and standard deviations are presented in Table 4.5.

The same findings emerged for the car-driving scenario. Participants rated energy consciousness of the car driver with the positive symbolic significant behavior (Prius driver) significantly higher than the one of the car driver with the negative symbolic significant behavior (SUV driver) when no detailed information about car's fuel consumption was provided, as well as when detailed fuel consumption information was given (see Table 4.5).

Table 4.5. **Energy-Consciousness Ratings for Energy Consumers with Positive and Negative Symbolic Significant Behavior Differentiated According to Fuel Consumption Information Condition and Energy Consumption Scenario**

Energy consumption scenario	Information on fuel consumption	Value of symbolic significant behavior				t-test result
		Positive		Negative		
		M (SD)	n	M (SD)	n	
Commuting	No	4.68 (1.40)	60	2.26 (1.09)	61	$t(119) = 10.63$, $p < .001$, $d = 1.93$
	Yes	4.87 (1.03)	60	2.37 (1.32)	62	$t(120) = 11.60$, $p < .001$, $d = 2.10$
Car driving	No	3.56 (1.43)	62	2.38 (1.12)	60	$t(120) = 5.06$, $p < .001$, $d = 0.92$
	Yes	3.59 (1.38)	61	2.78 (1.18)	60	$t(119) = 3.45$, $p = .001$, $d = 0.63$

Note. Means and standard deviations and results of t-tests are presented.

4.3. Discussion

In Study 3, a further supposition that different purposes underlie energy consumers' behaviors was ruled out. Descriptions were formulated in such a way that the assumption of equal purposes was assured, and analyses still revealed a significant effect of reliance on symbolic significant behavior. Furthermore, stability of the effect was proven, since provision of detailed information on fuel consumption enabling an exact calculation of the total energy consumed by the mobility behavior did not eliminate the appeal of the symbolic significance heuristic; that is, it did not result in a more adequate judgment.

Results of Study 3 testing for the stability of the effect were rather encouraging and motivated researchers to go a step further and conduct other stability tests that use even more extremely designed decision situations with regard to emphasis on total energy consumption associated with a person's behavior. A further possibility to draw people's attention more toward energy-related information of a rather symbolic neutral nature is to formulate the question even more concretely by directly asking the participants to judge a person's energy consumption related to the described behavior.

5. Study 4: Energy Consumption Judgment

So far, we have always asked participants to rate energy consciousness of the described person. Thereby, participants based their judgment on information related to energy consumption behavior. Consequently, the energy-consciousness rating only indirectly reflects

participants' estimation of energy consumption. Aiming to expand the focus on all consumption-related information that is supposed to finally result in a more adequate judgment, participants could be directly asked to rate energy consumption of the described person with regard to his/her consumption behavior. This procedure allows transferring provided information related to energy consumption one to one to the judgment process without converting it into a measure of energy consciousness, which possibly entails a loss of information. Moreover, a rating of energy consciousness is probably also more affected by other factors, such as beliefs and attitudes, which are especially susceptible to symbolic significant characteristics and therefore might enforce misperception.

The aim of the fourth study was to conduct another stability test of the effect of the reliance on symbolic significant behavior by directly asking for a judgment of energy consumption while providing all information necessary to calculate total energy consumption.

5.1. Method

5.1.1. Participants

A total of 984 persons participated in the fourth study. Participants were randomly selected from an Internet panel of the Swiss market research institution LINK. Data were collected in the course of an online survey implemented by the research institution; this survey is sent weekly to a random sample of Internet panel members of the French- and German-speaking parts of Switzerland. These weekly online surveys always consist of a composition of various studies investigating different research topics. The data collection period lasted from July 22 to August 2, 2011. The sample included 555 (56.4%) women and 429 (43.6%) men with an average age of 46 (*SD* = 14). Age ranged between 18 and 73 years (only adults were assessed in our study). About one-fifth (21.6%) of the participants were residents of the French-speaking part of Switzerland, and about four-fifths (78.4%) were from the German-speaking part.

5.1.2. Materials and Procedure

The descriptions of commuters and car drivers incorporating detailed information on fuel consumption of the vehicles previously used in Study 3 were applied. The experimental material presented to participants differed only in the wording of the dependent variable. Unlike in the previous studies, participants were asked to rate a person's energy consumption with regard to the described mobility behavior: "How do you judge the energy consumption of Mr. XY with regard to the mobility behavior described above?" Participants rated persons' energy consumption on a 6-point scale ranging from 1 (s*mall energy consumption*) to 6 (*high energy consumption*).

Participants were either presented with one energy consumer description (between-subjects design) or with both descriptions (within-subjects design). In the within-subjects design, energy consumer descriptions were presented one upon the other and rotated in their position, once above and once below. Participants were randomly assigned to the experimental condition in which only one description (either the person with the positive or the negative symbolic significant behavior) was shown or to the condition in which both descriptions were presented. To assure that about an equal number of energy consumption ratings for descriptions of energy consumers with positive and negative symbolic significant behavior were made for the two experimental conditions, two-thirds of the participants were assigned to the condition showing only one description (commuting scenario: positive value *n* = 169, negative value *n* = 163; car-driving scenario: positive value *n* = 159, negative value *n* = 162), and one-third to the condition presenting both (commuting scenario: *n* = 169; car-driving scenario *n* = 162). Participants were only confronted with one scenario, either the commuting scenario or the car-driving scenario.

5.2. Results

The results are in line with the findings of the preceding studies. In the commuting scenario, judging energy consumption associated with commuting to work, energy consumption of the train commuter (representing the person with the positive symbolic significant behavior) was assumed to be smaller than the one of the car commuter (representing the person with the negative symbolic significant behavior). This difference was found to be significant for the between-subjects design (M = 1.99, SD = 1.12 vs. M = 3.84, SD = 1.55), $t(330) = 12.49$, $p < .001$, d = 1.37, and for the within-subjects design (M = 2.09, SD = 1.17 vs. M = 3.78, SD = 1.51), $t(168) = 11.00$, $p < .001$, d = 1.20.

The same results emerged for the car-driving scenario when judging energy consumption associated with mobility behavior related to the car. Energy consumption of the car driver with the positive symbolic significant behavior (the Prius driver) was considered lower than energy consumption of the car driver with the negative symbolic significant behavior (the SUV driver). This was true for the between-subjects design (M = 2.92, SD = 1.41 vs. M = 4.07, SD = 1.27), $t(319) = 7.70$, $p < .001$, d = 0.86, and for the within-subjects design (M = 2.75, SD = 1.41 vs. M = 4.28, SD = 1.23), $t(161) = 10.03$, $p < .001$, d = 1.11.

5.3. Discussion

The results of Study 4 provided further strong evidence for people's reliance on symbolic significance and its stability. Ruling out the uncertainty that misjudgment could be ascribed to people's tendency to automatically generalize to other energy-related behaviors or assume different use purposes, participants based their judgment solely on symbolic significant behavior, even when they were directly asked to rate energy consumption. Findings impressively show that the effect persists even when participants were explicitly asked for a judgment of energy consumption, provided with all the information required to precisely calculate energy consumption, and given the opportunity to compare all characteristics. Although trying to foster the consideration of all presented characteristics by formulating more directed descriptions and questions, a mitigation of the dominance of symbolic significant behavior that would finally result in a more adequate judgment could not be achieved.

Thus far, we have provided strong evidence for the heuristic of symbolic significance in demonstrating the reliance on symbolic significant behavior under several conditions, showing that provided consumption information is not processed and included in decision making in an adequate manner. However, to this point, it still lacks an ultimate confirmation that the revealed effect is in fact attributable to the characteristics defined as symbolic significant, and is not induced by other characteristics or factors.

6. Study 5: Varying the Symbolic Significance Level

The preceding studies relied on the assumption that certain characteristics, that is, the car type in the car driving-scenario and the means of transportation in the commuting scenario, are the most symbolic significant characteristics on which judgment is based. However, in the case of the car-driving scenario, there are three characteristics that can influence the decision: the symbolic significant information on the type of car, the energy-efficiency label, and the fuel consumption of the vehicles. As the purpose of the energy-efficiency label is to provide consumers with a possibility to easily compare cars or appliances with regard to their energy consumption – thus, the label possibly represents a strong cue and also holds a certain symbolic significance – it could be argued that this information is the main driver of people's evaluations. Another alternative explanation could be that the effect found in the last study when specifically asking to judge energy consumption is simply the result of a misun-

derstanding. Participants possibly interpreted the question to mean that they had to assess fuel efficiency (l/100 km) of the vehicle, even though asked to judge energy consumption with regard to the specific mobility behavior. Given that the former alternative explanation holds true, and it is in fact the energy-efficiency label that mainly steers the effect, whether or not information on car type is presented along with the energy-efficiency label would make no difference on the energy-consumption rating. In both cases, information on the energy-efficiency label is provided, and thus the effect should be equally pronounced. If the effect is driven by a misunderstanding, and participants rate energy consumption in terms of fuel consumption of the car per 100 km, it would not matter whether participants were provided with information on type of car, and/or energy-efficiency label along with detailed information on fuel consumption. In each case, fuel-consumption is indicated, which represents the only information considered, according to this alternative explanation. As a consequence, the energy-consumption rating should be the same in both cases. However, if we are right in stating that the effect is attributable to symbolic significant information, that is, the type of car, the effect should be more pronounced if symbolic significant information is entailed in the description.

Taken together, the subject of Study 5 was to rule out alternative explanations that postulate that the effect was due to focus on other informational attributes, such as the energy-efficiency label or fuel consumption, and to provide support for our assumption that the effect demonstrated in the previous studies is in fact attributable to the characteristics we claimed to have high symbolic significance.

6.1. Method

6.1.1. Participants

Participants were recruited by the Swiss market research institution LINK and surveyed in the same way as described in Study 4. The data collection took place from October 14 to October 24, 2011.The final sample consisted of a total of 507 persons, 288 (56.8%) women and 219 (43.2%) men. The average age was 47 (*SD* = 14) years, ranging from 18 to 74 years. One-fourth (24.5%) of the participants were residents of the French-speaking part of Switzerland, and about three-fourths (75.5%) were from the German-speaking part.

6.1.2. Materials and Procedure

The car-driving scenario was utilized, as this scenario also entailed information on the energy-efficiency label that probably represents a characteristic of a different level of symbolic significance. The experiment consisted of three conditions that differed in symbolic significance of the characteristics that were provided. In the first condition – the “high symbolic significance” condition (*n* = 170) – participants were presented with exactly the same car driver descriptions as were used in Study 4. Besides the symbolic neutral information on covered annual distance, participants were presented with information on car type (Prius or SUV), the energy-efficiency label, and fuel consumption (l/100 km). The information provided to participants assigned to the second condition – the “low symbolic significance” condition (*n* = 167) – was exactly the same, with the exception that no more information on car type was included. In the third condition – the “no symbolic significance” condition (*n* = 170) – along with the symbolic neutral information on covered annual distance only information on fuel consumption was provided. Participants were randomly assigned to one out of the three conditions. In each condition, comparability was given, meaning that both car drivers were presented (within-subjects design). Based on the information provided in the specific condition, participants had to judge each car driver’s energy consumption with regard to the described mobility behavior on a 6-point scale ranging from 1 (s*mall energy consumption*) to 6 (*high energy consumption*). The question was formulated in the same manner as in Study 4: “How do you judge the energy consumption of Mr. XY with regard to the mobility behavior described above?” The previous studies showed that presentation order of the energy consumer de-

scriptions exerts no influence on participants' energy consumption ratings; therefore, position of the descriptions was not rotated.

6.2. Results

A 3 x 2 ANOVA was performed with the between-subjects factor symbolic significance ("high symbolic significance" vs. "low symbolic significance" vs. "no symbolic significance") and the within-subjects factor car driver description (car driver 1: 28,700 km vs. car driver 2: 11,400 km). Car driver 1 was the one with a negative value of the symbolic neutral behavioral attribute, thus representing the car driver with the actually higher energy consumption, that is, the Prius driver, while car driver 2 was the one with a positive value of the symbolic neutral behavioral attribute, thus representing the car driver with the actually lower energy consumption, that is, the SUV driver. Participants' rating on car drivers' energy consumption represented the dependent variable.

The conducted ANOVA yielded a significant main effect of the within-subjects factor car driver description, $F(1, 504) = 124.22$, $p < .001$, $\eta_p^2 = .198$. The main effect of the between-subjects factor symbolic significance did not reach significance, $F(2, 504) = 0.53$, $p = .588$, $\eta_p^2 = .002$. As expected, a significant interaction between the factor symbolic significance and the factor car driver description emerged, $F(2, 504) = 23.70$, $p < .001$, $\eta_p^2 = .086$ (Figure 4.1). The interaction indicates that characteristics of different symbolic significance result in a different pronunciation of the effect, more precisely, of the neglect of the value regarding covered distance and the corresponding misperception regarding energy consumption.

In a second step, data were analyzed in more detail comparing the individual levels of the factors. Simple main effect analyses of the factor car driver description were run separately for each symbolic significance condition. Results provided further support for our assumption, showing that the effect of neglecting the symbolic neutral behavioral attribute, that is, the value of covered distance, on estimated energy consumption is by far strongest when the characteristics of high symbolic significance, that is, the car type, were included in the consumer descriptions, $F(1, 504) = 144.32$, $p < .001$, with an effect size of $d = 1.28$. Car driver 1, even though having a negative symbolic neutral behavioral attribute and actually consuming more energy, was assumed to consume less energy than car driver 2, having a positive symbolic neutral behavioral attribute. For the other two conditions, the low symbolic significance condition, $F(1, 504) = 8.15$, $p = .004$, and the no symbolic significance condition, $F(1, 504) = 19.97$, $p < .001$, the effect of neglecting the symbolic neutral behavioral attribute on energy consumption judgment was still significant; however, the effect was considerably smaller, $d = 0.32$ respectively $d = 0.47$.

Further analyses in terms of simple comparisons between the symbolic significance conditions conducted for each level of the factor car driver description separately added further support for our hypothesis. Simple comparison yielded no significant difference between the conditions low symbolic significance and no symbolic significance with regard to the description of car driver 1 with the negative symbolic neutral behavioral attribute, $F(1, 504) = 0.00$, $p = .947$, as well as with regard to the description of car driver 2 with the positive symbolic neutral behavioral attribute, $F(1, 504) = 2.39$, $p = .123$. In accordance with our hypothesis, the energy-consumption judgments, however, differed significantly between the high symbolic significance condition and the two other ones, the low and the no symbolic significance condition. This was true for the description of car driver 1 with the negative symbolic neutral behavioral attribute, $F(1, 504) = 17.34$, $p < .001$, respectively, $F(1, 504) = 16.94$, $p < .001$ (corresponding to an effect size of $d = 0.46$, respectively, $d = 0.44$), as well as for the description of car driver 2 with the positive symbolic neutral behavioral attribute, $F(1, 504) = 23.41$, $p < .001$, respectively, $F(1, 504) = 10.95$, $p = .001$ (corresponding to an effect size of $d = 0.53$, respectively, $d = 0.36$). More precisely, the energy consumption of car driver 1 with the negative symbolic neutral behavioral attribute (i.e., large distance covered), representing the car

driver with the actually higher energy consumption, was judged significantly lower in the condition in which high symbolic significant characteristics were included compared to the other symbolic significance conditions. On the other hand, energy consumption of car driver 2 with the positive symbolic neutral behavioral attribute (i.e., small distance covered), representing the car driver with the actually lower energy consumption, was rated significantly higher in the high symbolic significance condition than in the other two conditions.

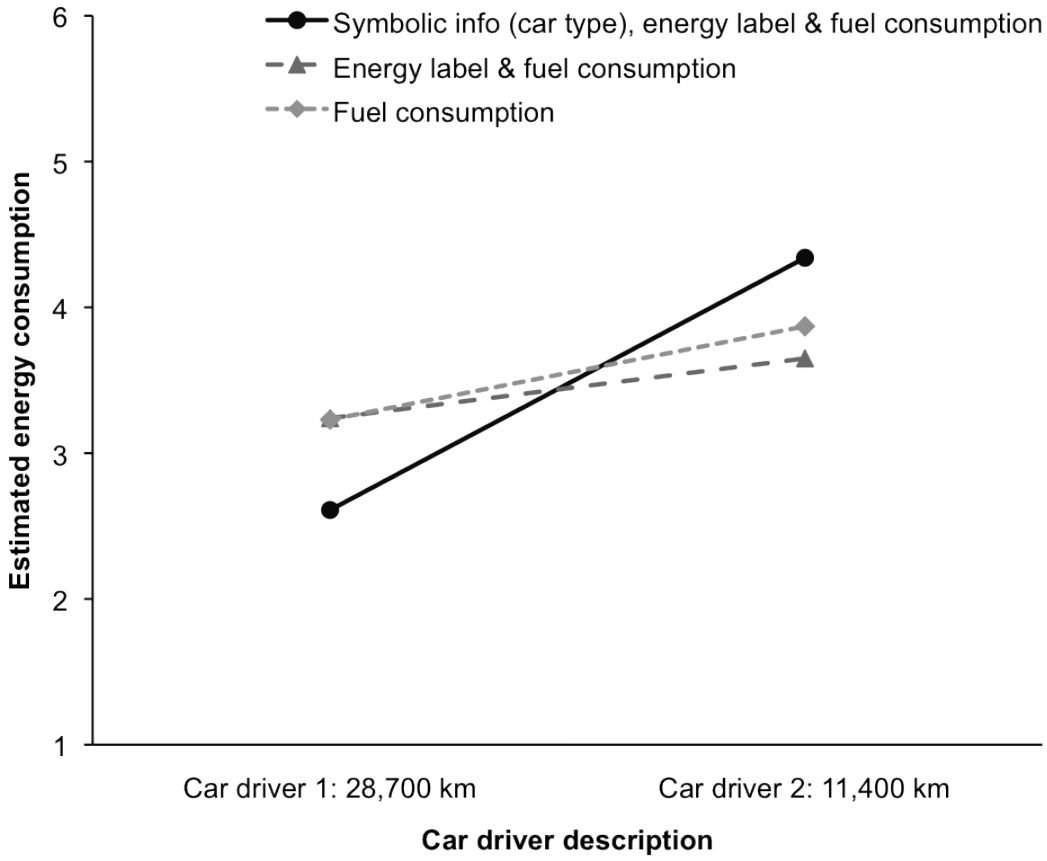


Figure 4.1. **Estimated energy consumption with regard to mobility behavior related to car as a function of symbolic significance (high vs. low vs. no) and car driver description (car driver 1 with the negative symbolic neutral behavior: 28,700 km vs. car driver 2 with the positive symbolic neutral behavior: 11,400 km). The car driver descriptions remained the same with regard to the value of the symbolic neutral behavioral attribute, but changed with regard to the extent of the information provided on car type, energy label, and fuel consumption: In the "high symbolic significance" condition (black line), participants were provided with information on car type (plus picture), energy label, and fuel consumption; in the "low symbolic significance" condition (dark gray line), participants were presented with information on energy label, and fuel consumption; and in the "no symbolic significance" condition (light gray line), participants were given information on fuel consumption.**

6.3. Discussion

The findings of Study 5 substantiate the assumption that characteristics are of differing symbolic significance, which forms the basis of the heuristic of symbolic significance. The study results confirm our hypothesis that people's fallacy in judging energy consumption is attributable to their tendency to rely on characteristics with high symbolic significance when making decisions; that is, they apply the heuristic of symbolic significance.

In Study 5, furthermore, we ruled out the alternative explanation that the effect is due to a misunderstanding, which is, that people solely judged the provided information about fuel consumption.

7. Summary and Concluding Discussion

Through our everyday behaviors, we are constantly communicating; in other words, we indirectly make a statement about ourselves. An action always carries symbolic meaning that is generally agreed upon because the meaning was attributed in social interactions (cf., Charon, 2007), and this is also true for behaviors related to energy consumption. The various energy consumption and conservation behaviors differ in the degree to which they are the subjects of social interactions (e.g., communication campaigns emphasizing energy-saving actions). Consequently, they are of different symbolic significance. The complexity of the social world calls for the application of certain rules of thumb to arrive in an efficient, resource saving way at a satisfying decision. Therefore, according to the rationale of attribute substitution, representing a general characteristic of heuristics, we hypothesized that people base judgments regarding a person's energy consumption predominantly on symbolic significant attributes while ignoring the information content of other attributes. And this is what we demonstrated in an impressive way across various studies (an overview of all the studies can be found in Table D1 in Appendix D). We provided evidence for the symbolic significance heuristic in showing that participants overestimated energy friendliness of energy consumers described by a positive symbolic significant attribute and a negative symbolic neutral behavioral attribute (i.e., information of less symbolic nature), and that they underestimated energy friendliness of energy consumers described by a negative symbolic significant attribute and a positive symbolic neutral one. This finding is even more impressive, as de facto the person with the positive symbolic significant attribute actually consumed more energy than the one with the negative symbolic significant attribute. The effect of reliance on symbolic significant behavioral attributes was demonstrated for various energy-consumption scenarios covering different domains, thus lending support for the generalizability of the effect to various energy-related behavioral domains. The studies revealed that individuals are susceptible to effects of symbolic significance of information on energy consumption when it comes to the judgment of a person's general (Study 1) and behavior-specific energy consciousness (Study 2). In general, the effect of the symbolic significance heuristic on judgments on energy consciousness proved to be of considerable size and remarkable robustness.

In the course of the studies, several alternative explanations regarding the cause for the effect were ruled out. For example, the reasoning underlying the evaluability hypothesis (Hsee, 1996) that individuals consider only one attribute because the other one is harder to evaluate independently, that is, without any reference, has proven inadequate to explain the phenomenon. The effect persisted even when individuals were provided with reference information by presenting both energy consumer descriptions simultaneously (Study 1, 2, and 4). Furthermore, it could be argued that the differing consideration of behavioral attributes is due to differences in their diagnosticity for inferring a person's energy-friendly attitude (cf., Cornelissen, Pandelaere, Warlop, & Dewitte, 2008). Two diagnosticity criteria that are especially important related to environmental behavior are frequency of occurrence and causal clarity. The former refers to the fact that behaviors frequently performed in the population provide no distinctive information, and thus are less diagnostic for deriving a particular attitude. Causal clarity denotes the fact that the higher the number of reasons a behavior could be attributed to, the more ambiguous, that is, the less diagnostic, the behavior is. In line with this reasoning on the diagnosticity issue, Cornelissen et al. (2008) demonstrated that people's judgments of causal clarity and frequency of occurrence of ecological behaviors correlated negatively with perceived informativeness, that is, diagnosticity, for inference of a person's environmental consciousness. In more general terms, an ecological behavior, which is more frequently performed by people, or which has a higher number of reasons it could be attributed to, is considered less diagnostic of a person's green attitude. However, for the ef-

fects found in the presented studies, the above mentioned diagnosticity criteria provide no satisfying explanation. The reasoning regarding frequency would postulate that, for example, in the commuting scenario covering very long distances to work (e.g., 120 km) would be perceived as a behavior more frequently occurring than the behavior of choosing the train to commute to work. As a consequence, the behavior of commuting large distances is supposed to be less diagnostic for inference of energy friendliness and considered less in the judgment process. Yet, it is hard to imagine that commuting a very long distance is perceived as a behavior more frequently engaged in than choosing to commute by train, especially considering the fact that long distances are probably mainly commuted by train. Including the short distances that are also commuted by train, the behavior of taking the train to commute to work would rather be perceived as the behavior more frequently performed. Therefore, insufficient diagnosticity due to high frequency of occurrence does not hold as an explanation for the effect demonstrated. The possibility that a behavioral attribute is neglected due to its insufficient causal clarity and the resulting nondiagnosticity can also be considered ruled out as an alternative explanation. In our studies (Study 3, 4, and 5) energy-consumption scenarios were phrased in such a way that ascription of equal purposes underlying the consumption behavior was assured. Thereby, the scope of possible reasons attributable to the described behaviors was reduced, and thus causal clarity was increased.

During our study of the symbolic significance heuristic, we also conducted several stability tests to find out about the strength of the effect of reliance on symbolic significance. As the findings revealed, the effect is remarkably stable. The presentation of all the information required to exactly calculate total energy consumption (Study 3) and explicitly pointing to the estimation of energy consumption as a whole by directly asking participants to rate energy consumption (Study 4) did not induce a more reflective attitude leading to the consideration of all the information on energy consumption. Participants' tendency to adhere to the heuristic attribute, that is, the symbolic significance, even though descriptions and instructions were formulated in a way to highlight other crucial information attributes is in line with the findings of previous studies on heuristics (e.g., Tversky & Kahneman, 1973, 1983). For example, studies found that individuals still showed biases associated with representativeness even when presented with strong cues that pointed to the normative response (cf., Kahneman & Frederick, 2005). However, unlike in other studies on heuristics, the effect of symbolic significance proved to be stable even in within-subjects designs in which participants were provided with the possibility to directly compare the different informational attributes; thus, inconsistencies in judgments should have been most obvious (Hsee, 1996; cf., Kahneman & Frederick, 2005).

The effect of the heuristic of symbolic significance is most astonishing for decision situations in which all the information necessary to compute energy consumption is available and participants are explicitly asked to judge energy consumption with regard to the described behavior. In such a situation, it is hardly imaginable that people are still susceptible to the fallacy of symbolic significance and do not arrive at an adequate judgment; therefore, the inclination to find plausible explanations for this fallacy is probably quite high, and thus the assumption that the effect is due to some misunderstanding seems quite reasonable. However, to rule out any concerns and doubts, it is essential to provide strong evidence for the processes that are assumed to drive decision making. Thus, a final attempt of our study on the symbolic significance heuristic was to provide support for the reliance on behavioral characteristics defined as highly symbolic significant. The findings of Study 5 confirm the assumptions underlying the postulated heuristic in showing that overestimation and underestimation of energy consumption is by far most pronounced when highly symbolic significant characteristics are available. Furthermore, the study demonstrated that only extremely small effects are attributable to other decision bases. Consequently, alternative explanations did not prove to be valid.

All these findings provide evidence for the robustness of the effect of reliance on symbolic significant attributes, which in turn means that the effect is hard to counteract. The stability of the effect is quite impressive, given that it still persists when detailed information is provided

and participants are directly asked to rate energy consumption. Consequently, the question arises whether there are other processes that reinforce the neglect of other crucial, symbolic neutral, information. There is, for example, the possibility that a kind of confirmation bias exerts a reinforcing influence. Confirmation bias describes a person's tendency to unconsciously selectively treat evidence in order to defend beliefs or hypotheses they wish to maintain (Nickerson, 1998). Thus, once an opinion is formed on a person's energy consumption or energy consciousness based on symbolic significant behaviors, participants could neglect the provided information on fuel consumption to uphold their former belief, thereby additionally fostering the effect of symbolic significance.

Taking a closer look at the dates the studies were carried out, it becomes clear that the first study was conducted shortly before the nuclear accident at Fukushima Daiichi and the second study shortly afterwards. Therefore, the question arises whether a "Fukushima effect" is recognizable, that is, whether the symbolic significance bias is more pronounced in the studies taking place after the accident. However, the differences in design and material used in the studies do not allow a conclusive answer to this question. It is not possible to discern which portion of the minimal changes in effect size is attributable to experimental manipulations (i.e., changes in study design and material) and which one to a potential "Fukushima effect". What clearly emerges from the findings, however, is that the effect of symbolic significance is of substantial strength and stability regardless of experimental manipulation or whether the study took place before or after the nuclear accident in Fukushima Daiichi.

When talking about the symbolic meaning of behavior, the link to stereotype thinking is automatically made; consequently, the question arises as to how the symbolic significance heuristic is distinguishable from the representativeness heuristic. For the investigated scenarios, the representativeness heuristic is not suitable since the descriptions of the persons include behavioral attributes that are of opposing value, and thus, representative of different, or more precisely, mutually exclusive stereotypes of energy consumers and their corresponding attitudinal and behavioral characteristics. The representativeness heuristic postulates that individuals judge the probability that a person belongs to a certain category (in this case the category of an energy-friendly or an energy-unfriendly consumer) based on the degree the person matches the stereotype of the category (cf., Kahneman, 2003; Kahneman & Frederick, 2002). Thus, it provides no useful judgmental criteria, since the descriptions entailed two contradictory stereotypical attributes. The symbolic significance heuristic, on the other hand, provides an answer to this conflicting situation in going one step further and stating that the stereotypical attribute with the higher symbolic significance serves as the heuristic attribute to judge attitudinal and behavioral characteristics associated with the specific energy consumer stereotype. All points mentioned above provide support for our assumption that individuals, in certain judgment situations, base their judgment on the symbolic significance of behavioral attributes, thereby largely ignoring other decisive attributes that are of less symbolic significance, that is, of a more symbolic neutral nature.

Behavioral attributes carrying a symbolic meaning may also be considered as evoking a specific affective feeling, especially when it comes to judgments related to a rather emotional subject, such as energy consumption. Therefore, it is obvious to establish a link to the affect heuristic (Slovic, Finucane, Peters, & MacGregor, 2007), which is also assumed to possibly underlie moral heuristics (Sinnott-Armstrong, Young, & Cushman, 2010), and to briefly discuss in what way the affect and the symbolic significance heuristic share positions and in what way they differ. From the viewpoint of the affect heuristic, the precision of the affective impressions, that is, evaluability, is crucial in judgment and decision making. Accordingly, the affect heuristic postulates that the more precise or the easier the value of the attribute can be mapped into an affective impression, that is the higher its evaluability, the higher its weight in decision making. Wilson and Arvai (2006) went a step further, merging themes from evaluability and studies on affect. Postulating an affect-based value neglect that refers to the tendency to overweight affective impressions of a problem context while neglecting other decision-relevant risk information, they hypothesized that affective characteristics outweigh evaluability gains achieved through side-by-side presentation. In line with their assumption,

they showed that, in a side-by-side evaluation, individuals preferred managing an affect-rich but lower risk problem to an affect-neutral but higher risk problem. However, affect heuristic or affect-based approaches provide no satisfying answer to the question of which attribute the decision relies on when both are of opposing values, or in terms of the affect heuristic, of opposing affective impressions. A comment by Wardman (2006) discussing the impact of affect on risk judgments also heads in this direction. He argues that when a stimulus holds positive and negative attributes, this could result in ambiguity, and therefore, other mental processing is necessary to arrive at a satisfactory judgment that no longer relies on the affect heuristic. A further critical point raised by Wardman (2006) is researchers' tendency to neglect the social basis of emotion. The symbolic significance heuristic provides an answer to both concerns. It considers the social basis in the formation of symbolic meaning of a behavior and also comes up with an answer on which attribute a judgment relies on in decision situations entailing attributes of opposing values (i.e., values eliciting a positive versus values eliciting a negative affect), which is the one with the higher symbolic significance. Summing up, we can state that symbolic behaviors certainly elicit a specific affect that is crucial for judgment and decision making; however, for certain judgment situations entailing, for example, a specific constellation of attributes, it seems that the affect heuristic is too general and not sufficiently differentiated to serve as a suitable decision heuristic, that is its prediction quality is limited (Sjöberg, 2006).

The findings of the study on the symbolic significance heuristic in the field of energy-related behavior bear several implications. The fallacy of symbolic significant behavior is probably not restricted only to judgments of energy consciousness or consumption related to consumption behavior of others, but may also affect evaluation of one's own consumption behavior. Individuals aiming to show energy-friendly behavior, that is, to reduce energy consumption, probably start with the behavior most prominently symbolizing energy consciousness. Once they have engaged in the symbolic significant behavior, they consider themselves energy conscious and no longer pay attention to related behavioral aspects. As a consequence, other essential but rather symbolic neutral conservation behaviors might no longer be engaged in or might even be intensified due to lacking consideration. This might neutralize the positive effect of the symbolic significant energy-friendly behavior, and in the worst case, even lead to higher energy consumption than before. Consequently, at least in the case of car drivers, this could be seen as a certain rebound effect (Hertwich, 2005). Due to the overestimation, symbolic significant behaviors could also be considered as legitimization to behave in a less energy-friendly manner with respect to other consumption behaviors. In a recent study, Mazar and Zhong (2010) provided evidence that engaging in a socially desirable behavior, such as purchasing green products, establishes moral credentials, licensing morally questionable behaviors. They showed that people acted less altruistically after purchasing green products and were more likely to cheat and steal. Given the findings of this study, it is quite conceivable that especially showing a symbolic significant energy-friendly behavior could be perceived as licensing socially undesirable behaviors, such as increased engagement in other energy-consuming behaviors.

From the presented study findings and the further-reaching reflections on the findings discussed above, several policy implications can be derived. To reduce misperceptions due to people's focus on symbolic significant behavior and neglect of symbolic neutral behaviors, it is essential to devote more attention to the latter ones in communication campaigns attempting to increase people's energy-conservation efforts. Even though symbolic significant behaviors can per se have high savings potential, such as driving an energy-friendly car, it is important to sensitize people for behaviors that are of symbolic neutral nature and raise their awareness about the fact that energy consumption is an interplay between several factors. It is necessary that people realize that having a look at the whole picture and not only at symbolic significant attributes, although it requires increased effort, is a precondition for an adequate judgment and for engagement in effective conservation actions.

The presented studies on the symbolic significance heuristics also bear limitations that we would like to briefly address. As the experiments were conducted in the form of online stud-

ies, the question regarding representativeness inevitably arises (Rhodes, Bowie, & Hergenrather, 2003). Participation in the study was dependent upon having Internet access, so participation was restricted to people fulfilling this criterion, and therefore, no random sampling can be ensured. However, as we made use of various recruiting methods and, consequently, had considerable variety of study samples – members of our own panel, students, members of an Internet panel of a market research institution – overall the study sample can nevertheless be considered as rather mixed, and thus the demonstrated application of the symbolic significance heuristic is surely generalizable to a certain degree.

Several questions remain unanswered and are worthwhile as subjects of further studies. The effect of reliance on symbolic significant attributes has proven to be quite stable and disappeared neither by provision of detailed energy consumption information nor by directly asking to rate the amount of energy consumed. Therefore, the question of how this effect could be mitigated or even steered in the right direction still remains to be answered. This research question is of particular importance, especially when it comes to the development of adequate policy measures. Individuals are differently susceptible to the effect of symbolic significance; for some, the effect is highly pronounced, and for others, it is moderately pronounced; for still others, although just an extremely small minority, there is no effect. A classification and characterization of the different groups of individuals differing in susceptibility to the effect would contribute to the identification of the target groups of interventions and the subsequent development of tailored communication strategies, as well as to the understanding of the underlying mechanisms. For example, factors such as an individual's own environmental consciousness or energy-related knowledge could possibly exert an influence on the extent of the effect and could be an interesting issue of investigation to shed more light on the functioning of the symbolic significance heuristic and the determinants of the symbolic significance fallacy.

The application of the heuristic of symbolic significance is not restricted to energy- or environmental-related issues, but can be generalized to other behavioral domains where people engage in behaviors with high symbolic significance. For example, the symbolic significance heuristic could also come into play in the field of pro-social behavior. Given that, for instance, donations to a charity are perceived as symbolic significant for pro-social behavior, the pro-social behavior of a company engaging in humanitarian behavior donating a large amount of money to a charity but on the other hand paying only a moderate wage to its employees could be overestimated, whereas the pro-social behavior of a company donating a smaller amount to a charity but assuring that its employees have a decent wage is underestimated. The investigation of the effects of the symbolic significance heuristic on decisions related to other fields could be an object of future research.

General Discussion

1. Introduction

Given the urgent need to reduce energy consumption, identifying energy consumption sectors with promising energy-saving potentials is essential. One of the sectors that accounts for a substantial portion of energy consumption is the household sector (BFE, 2011a). Households have considerable energy saving potential and are worth the focus of interventions. However, the goal of efficiently encouraging energy consumers to reduce their energy consumption faces several challenges. To a certain extent, these challenges are the result of human nature. Energy consumers differ in characteristics, such as personality, and their consumption behavior is driven by different needs and desires. Furthermore, they differ in the extent and type of conservation behaviors that they are engaged in. This diversity of conservation behaviors and motivations demands tailored intervention measures that effectively address individual consumer types. One of the characteristics that people have in common is that they do not always process information in a way that is considered rational. Instead, they, for example, tend to rely on heuristics that may misfire and result in misperceptions in certain situations (Tversky & Kahneman, 1974). Another shared characteristic is that they engage in social interaction and thus are influenced by social context (Charon, 2007; Cialdini, et al., 1991). This is also true for judgments that are related to energy consumption.

In summary, the first aim of this research project was to identify and describe the different types of energy consumers and to reveal possible individual starting points that will be used to implement intervention measures. The second aim of this research project was to provide evidence that supports the contention that people rely on a newly postulated heuristic shaped by social context, which is called the *symbolic significance heuristic*.

The first part of this research project focused on the categorization and description of different types of energy consumers and reflects on possible starting points for interventions. In Chapter II, energy consumers were categorized based on a personality trait, that is, their social value orientation. Differentiating between several energy conservation behaviors it was aimed to investigate whether the differences in energy conservation efforts between consumers with different social value orientations persist across various consumption domains and whether these differences are dependent on the type of energy conservation measure. Chapter III identified and described different energy consumer types based on behavioral variables, that is, the different types of energy conservation measures they engage in and attitudinal variables related to energy consumption.

Chapter IV, which constitutes the second part of the research project, attempted to confirm people's application of a newly postulated heuristic; the *symbolic significance heuristic*, which people are assumed to rely on when it comes to judging others' energy consciousness and energy consumption. This heuristic is based on the assumption that people rely on the symbolic meanings of behaviors, which are attributed to behaviors in the course of social interaction. Five studies were conducted to provide evidence for the application of the *symbolic significance heuristic* and to test for its generalizability and the stability of the effect.

The following section provides an overview and discussion of the central findings of this research project. It follows a general evaluation of the research project addressing possible limitations and providing suggestions for future research. The research project closes with a general conclusion and elaborates on its implications for interventions that will promote the energy conservation efforts of consumers.

2. Central Findings

The aim of the first part of the research project was to provide a meaningful categorization and description of energy consumers that differentiates between the various possibilities to engage in energy conservation in terms of consumption domains and types of conservation measures. This portion of the research started with a more general characteristic, the social value orientation, forming the basis for the categorization and proceeded with an energy consumer segmentation that is directly based on behavioral variables related to energy consumption. Profiling the different energy consumer types is crucial because it is necessary for the development of tailored interventions. The second part of the research project provided evidence for the postulated heuristic of symbolic significance. This is of interest because heuristics may result in misperceptions (e.g., Attari, et al., 2010) that can, consequently, end up in engaging in less effective conservation behaviors. Thus, misperceptions due to reliance on heuristics may represent a barrier to efficient conservation efforts. On the other hand, analyzing people's reliance on symbolic significant behavioral attributes is of interest because it provides support for the impact of the social context.

In summary, it can be stated that the differentiation between the various energy conservation behaviors proved to be crucial in profiling the different energy consumer types and in revealing opportunities for actions and starting points for interventions. The studies identified several interesting consumer types offering various starting points. However, in the following, only the ones that offer the highest savings or improvement potentials will be discussed. Furthermore, studies on the *symbolic significance heuristic* provided support for people's reliance on symbolic significant behaviors and proved that the symbolic significance fallacy is remarkably robust.

2.1. Poor Performers are Not Lost Causes

Due to the differentiation between the various types of conservation behaviors and the comprehensive assessment of energy consumption related attitudinal and motivational factors, it was possible to arrive at a detailed picture of poor performers' energy consumption and conservation behaviors, as well as the underlying behavioral drivers. This proceeding enabled specific insights as to which conservation measures poor performers are likely to adopt and which they are likely to contest. Findings also pointed to the motives and beliefs underlying the energy-related behaviors of poor performers.

2.1.1. Capitalizing the Advantages Offered by Energy-Efficiency Measures

The study findings revealed that poor performers engage in energy conservation behaviors as long as these measures do not require any lifestyle changes and provide financial benefits. Adopting energy-efficiency measures meets both of these demands. It provides consumers with the financial benefits of energy conservation and it is not associated with any loss of comfort or change in lifestyle (Black, et al., 1985; Gardner & Stern, 2002). Conservation measures that are based on energy efficiency are generally more accepted than curtailment behaviors and shifts in consumption (Poortinga, et al., 2003).

Findings of the two studies forming the first part of this research project (Chapter II and Chapter III) support the argument that poor performers engage in energy conservation measures as long as those measures fulfill the above-mentioned criteria. In Chapter II in which energy consumers were categorized based on their social value orientation, analyses revealed that individualistic and competitive individuals do not differ in their engagement in energy-efficiency measures from prosocial individuals. However, they do differ in their underlying motivation. In the case of the individualists and competitors, their motivation was of a decidedly more financial nature. On the other hand, when it came to conservation behaviors based on curtailment or shifts in consumption (i.e., food), individualists were less eager to behave in an energy-friendly manner because the loss of comfort associated with these be-

haviors was perceived as being too high. A segment of poor performers that has similar characteristics, is the segment of materialistic energy consumers that was identified and described in Chapter III. Materialists were less willing to perform energy conservation behaviors that affect quality of life, such as curtailment behaviors and shifts in food consumption, or behaviors that are related to financial disadvantages, such as policy measures (e.g., increase of fuel price). However, when it came to energy-efficiency measures that provide financial benefits but do not require any cutbacks to their quality of life, materialists were willing to adopt these conservation measures. Furthermore, these findings support the notion of differentiating between energy-efficiency measures and shifts in consumption (i.e., food purchase). The low performers described in this section were quite engaged in energy-efficiency measures, but they did not show conservation efforts in terms of changes towards energy-friendly food purchase behavior. Proceeding in the same way as other segmentation studies by not differentiating between the two purchase-related behaviors (Gilg, et al., 2005; Jansson, et al., 2009), a detection of these energy consumer types and a differentiated description of their behavioral characteristics would not have been possible.

2.1.2. Competitive Thinking and Craving for Status and Approval

Results of the energy consumer classification studies in Chapter II and Chapter III suggest that there is also another motivation that actually emanates from a more self-interested nature of a consumer, but can have a positive effect on energy conservation. This motivation is the tendency to continuously compete with others and the striving to outperform others. This self-interested personality trait may result in increased conservation efforts, even though consumers might have to exert some effort or live with comfort restrictions. For example, increased conservation efforts could be based on the desire to gain financial advantages. A general desire to be more knowledgeable than others could be another motivation. In turn, this would result in more knowledge on effective energy conservation measures and a better performance of putting this knowledge into action. This motivation may possibly be reflected in the energy conservation behaviors of individuals categorized as competitors (cf. Chapter II). These individuals are considered least social because they strive for the largest possible difference between themselves and others, no matter how much they get themselves (cf. Van Lange & Joireman, 2008). The finding that competitors, despite their self-interested nature, show more energy-saving behaviors with regard to conservation measures that require effort and comfort restrictions than individualists, supports the notion and the necessity to differentiate between these two social value orientations. Since their behaviors are driven by differing motives, and thus offer different possibilities for interventions distinguishing between these two seems preferable as compared to treating them as equals, which is common in other studies on social value orientation (e.g., Gärling, et al., 2003; Joireman, et al., 1997).

Another motivation of competitive individuals to engage in energy conservation efforts could be related to reputational or status concerns. The theory of competitive altruism postulates that, through social approval of behaviors that are assumed to be unselfish, individuals are more likely to be attributed a certain status and prestige and they are more likely to be chosen as group leaders. Thus, reputational needs might underlie unselfish behavior (Van Vugt, et al., 2007). According to this reasoning, competitors' energy-friendly efforts could be driven by the desire to be attributed a certain status. The aim to comply with social norms (Cialdini, et al., 1991) is also related to social approval and is expressed in perceived social pressure to behave in ways that are defined as energy-friendly. This perceived pressure to comply with social norms is also a driving factor in increasing efforts in energy conservation and thus can be considered as a starting point for interventions. The problem-aware well-being-oriented energy consumer who was identified in Chapter III falls into this same category. He demonstrates only poor conservation behaviors but cares about how other people perceive his behavior, which is manifested in a certain feeling of social pressure to behave in energy-friendly ways.

2.1.3. Disposition of a Valuable Basis of Energy Consumption-Related Beliefs

There are poor performers who do not even engage in energy conservation measures that do not conflict with interests, such as comfort, convenience, or life-style, and who do not hold characteristics which may, motivated by self-interest, result in conservation behaviors. However, they dispose of belief structures that head in the right direction and that could be developed. Between the problem-aware well-being-oriented consumer and the convenience-oriented indifferent energy consumer (cf. Chapter III), who show the least amount of energy-friendly behaviors because convenience and comfort considerations prevail, there is one decisive difference. The problem-aware well-being-oriented consumer has considerable problem awareness and holds the belief that consumers' energy conservation efforts can make a substantial contribution. In other words, that the consumer can make a difference.

These findings are rather encouraging as awareness of consequences is considered an essential basis for the formation of personal norms according to the norm activation theory (Schwartz, 1977). However, in the case of the problem-aware well-being-oriented energy consumer, he/she lacks the ascription of responsibility in a next step. Another interesting insight is, that amongst individuals with the poorest savings efforts, there is a segment of consumers who believe in a consumer's ability to make an effective contribution by his/her conservation efforts. Perceived personal efficacy (i.e., perceived consumer effectiveness) emerged in various studies as a main driver of energy-friendly or pro-environmental behavior (Roberts, 1996; Straughan & Roberts, 1999). The fact that problem-aware well-being-oriented energy consumers represent the segment with the youngest participants suggest that these consumers grew up in a time in which the topic of environmental problems was integrated educationally as part of school curriculum or received through media. These insights into the topic of environmental problems provided in the course of education may, to some degree, shape belief structures. These structures may be supportive in motivating poor performers to adopt specific conservation behaviors.

Summing up, poor performers, even though they are rather self-interested by nature, still selectively show certain conservation behaviors that may be further enhanced. They dispose of promising personality and attitudinal characteristics that may serve as promising starting points for interventions. Thus, a rather self-interested way of thinking can also be a chance to encourage energy-friendly behavior (De Young, 2000).

2.2. Inconsistencies in Energy Savers' Conservation Behaviors – What About Purchase-Related Conservation Measures?

There exist energy consumers who engage in conservation behaviors that are associated with cutbacks in comfort and convenience (i.e., curtailment behaviors) and financial efforts (e.g., policy measures in terms of increase of fuel price) and who, in addition, hold strong beliefs and motivations that foster energy-friendly behavior. However, these behavioral characteristics cannot be considered indicative of the adoption of conservation behaviors. The identified selfless inconsequent energy saver provides evidence for the existence of an energy consumer type who adopts curtailment behaviors in the housing and mobility domain, accepts policy measures, and possesses beliefs and motivational characteristics that facilitate energy-friendly behavior. But when it comes to the adoption of energy-efficiency measures and energy-friendly food purchase behavior, he/she does not uphold his/her shown conservation efforts (cf. Chapter III). With respect to these conservation behaviors, the selfless inconsequent energy saver falls considerably behind when compared to the efforts shown by the two other segments of high performers: the idealistic and the thrifty energy saver.

By examining the energy conservation behaviors they engage in and the underlying attitudinal variables, it gets clear that the selfless inconsequent energy saver's comparatively smaller efforts in energy efficiency and food purchase-related measures are not founded on con-

cerns about comfort restrictions or financial disadvantages. A characteristic that these two behaviors have in common is that they are both purchase-related. This finding agrees with Peattie's (2001) notion that green purchasers and green consumers are not necessarily synonymous. Lacking trust in the environmental product claims of producers and retailers, which might be imputed as a sales argument, can be considered a possible barrier to energy-friendly purchase behavior (Peattie, 1995; Thogersen, 2000). Consequently, this way of thinking may result in doubts on the efficacy of energy-friendly purchasing behavior. Support for this notion stems from the focus groups that were conducted in the run-up to the studies of the present research project. In these studies, participants expressed their mistrust of labels claiming organic produce.

Another interesting finding that emerged from the study of the *symbolic significance heuristic* (cf. Chapter IV), which is worth addressing, is the low symbolic significance of the energy label when it comes to judgments of energy friendliness or unfriendliness. By analyzing the symbolic significance of the various informational attributes, the provision of the energy label did not outperform the sole indication of fuel consumption of a car (i.e., l/100 km) as a symbol for energy friendliness or unfriendliness. This is rather surprising as the energy label is intended to serve as a reference that facilitates people's assessment of the energy friendliness of products. Thus, it would be assumed that the energy label would hold some symbolic meaning. However, the results on energy labels' symbolic significance suggest a questioning of people's trust in labels.

To summarize, the willingness to engage in conservation behaviors requiring sacrifices in terms of comfort or financial issues and generally holding beliefs and attitudes supporting energy-friendly behavior do not guarantee that a person consistently engages in energy conservation efforts in all conservation domains and types. There are also other crucial factors, such as trust in product claims, that may constitute a barrier to certain energy-saving behaviors.

2.3. The Power of Symbolic Significance

In Chapter IV, across five studies evidence of people's reliance on the *symbolic significance heuristic* in judgments of others' energy consciousness and energy consumption has been provided. People tend to base their judgments on behaviors that are ascribed high symbolic significance with regard to energy consciousness and neglect behaviors that are of a rather symbolic neutral nature. This may particularly result in misperceptions and misjudgments if a person's general energy consumption behavior consists of symbolic significant and symbolic neutral behavioral attributes that are of opposing value. In the course of five studies (cf. Chapter IV), it was shown that people overestimate the energy consciousness and, consequently, underestimate energy consumption of an energy consumer engaging in a positive symbolic significant behavior (e.g., driving a Prius) but showing a negative symbolic neutral behavior (e.g., covering large distances by car). On the other hand, they underestimate the energy consciousness and overestimate energy consumption of a consumer performing a negative symbolic significant behavior (e.g., driving an SUV) but showing a positive symbolic neutral behavior (e.g., covering small distances by car). The consumer with the positive symbolic significant behavior was always judged as considerably more energy conscious and as consuming less energy than the consumer performing the negative symbolic significant behavior. The emerging effects of the symbolic significance fallacy on judgments on energy consciousness and consumption are even more astonishing as, when considering all provided information, the described energy consumers with the positive symbolic significant behaviors actually consumed more energy than the ones with the negative symbolic significant behaviors.

The symbolic significance fallacy is not restricted to judgments related to car driving behavior. It also holds true for other energy consumption domains. Reliance on the *symbolic signif-*

icance heuristic and the resulting misjudgments was also demonstrated in commuting, room heating, and meat consumption behavior. Thus, these findings suggest generalizability of the application of the *symbolic significance heuristic* to other energy consumption domains.

Furthermore, the symbolic significance fallacy proved to be remarkably strong and stable. Gains in evaluability of the specific behavioral attributes by allowing a direct comparison between the two energy consumers and their symbolic significant and neutral behaviors did not disrupt or weaken the effect. These findings challenge the evaluability hypothesis (Hsee, 1996) by showing that gains in evaluability are overridden by the dominance of symbolic significance. People's reliance on symbolic significance could not even be broken if they were presented with both consumer descriptions entailing detailed information on fuel consumption, allowing them to calculate energy consumption, and directly asking them to judge energy consumption related to the behavior described (e.g., car driving). The finding that not even the addition of strong cues pointing to the normative response induces a more reflective attitude is in line with other studies on the use of heuristics (cf. Kahneman & Frederick, 2005). However, an aspect that distinguishes the heuristic of symbolic significance from most other heuristics is that the *symbolic significance heuristic* is so prevalent that the effect even persists in within-subjects designs (Hsee, 1996; cf. Kahneman & Frederick, 2005).

The provision of evidence and the investigation of people's appliance of the *symbolic significance heuristic* are of particular importance in identifying potential behavioral barriers and drivers with regard to the promotion of energy-friendly behavior.

In summary, it can be stated that people rely on symbolic significant behavioral attributes when judging others' behaviors and ignore other crucial behavioral information that actually would be essential to relativize the symbolic significant attribute in order to arrive at an adequate judgment. This newly postulated *symbolic significance heuristic* proved to be impressively stable and is assumed to be generalizable to various energy consumption domains.

3. Evaluation of the Studies and Suggestions for Future Research

The present research project was quite comprehensive and carefully conducted from a methodological point of view. Besides quantitative research methods, qualitative research methods were also included. The survey and experiments conducted were preceded by focus groups that served as inputs for the following studies. The survey was conducted in two language regions and experiments were run using various study samples. However, there are some limitations that will be addressed in the following section. Furthermore, ideas for future research are provided.

One aim of the present research was to provide a differentiated and comprehensible characterization of different energy consumer types. However, due to the limited space of the questionnaire, which the two studies on energy consumer categorization relied on (cf. Chapter II and Chapter III), contextual forces were only marginally addressed and only indirectly through consumers beliefs. The main focus was on the differentiation between various types and domains of energy conservation behaviors, on psychosocial factors, and on capabilities. With a view to future segmentation studies striving for a behaviorally-differentiated and comprehensive characterization, it would be worthwhile to include contextual forces in a more extensive and direct way. The consideration of contextual forces is important because they also exert considerable influence on people's energy conservation and consumption behavior as they determine the scope of action (Corraliza & Berenguer, 2000; Guagnano, et al., 1995).

One of the intentions underlying the studies on consumer categorization was to provide a picture of the different energy consumer types in an attempt to account for all energy consumers and that is not restrictive to participants meeting specific criteria, such as owning a car (cf. Jansson, et al., 2009) or property. However, this brings about some cutbacks with regard to the items used to measure the specific conservation behavior types and the definition of the variables constituting the segmentation base in the cluster analysis. The former limitation mainly concerns energy-efficiency measures. As not all energy consumers are property owners and Switzerland is generally regarded as a nation of tenants, the index constructed as a measure for the adoption of energy-efficiency measures in the household did not include items that addressed behaviors related to insulation or that assessed adoption of energy-efficiency measures that were related to specific appliances (which are provided by the landlord), such as refrigerators. Furthermore, energy-friendly behaviors related to private car ownership were not included in the segmentation base of the cluster analysis in Chapter III. Only energy-friendly mobility behaviors that are not restricted to ownership of a car were included in the segmentation base. Behaviors related to private car ownership served solely as descriptive variables.

Another issue that needs to be addressed is the representativeness of the findings. The two studies on energy consumer categorization were based on data that was gained from a mail survey, and thus bear the potential problem of a self-selection bias. Persons that are more interested in the study subject are more likely to participate. Furthermore, the questionnaire is probably completed by the household member who is considered to be more familiar with the topic. This might also hold true for the conducted survey forming the data basis of the studies in Chapter II and Chapter III, where men were overrepresented in the sample. As a result, the findings cannot be considered entirely representative. The same problem applies for the samples used in the course of the study on the *symbolic significance heuristic* (cf. Chapter IV). However, with regard to the conducted online experiments an additional problem of representativeness arises. Since these experiments were conducted online, participation was restricted to individuals meeting the criterion of having Internet access (Rhodes, et al., 2003).

Another methodological issue concerns the measurement of participants' energy conservation behaviors based on self-report. It was shown that there generally exist discrepancies between self-reported and actual behavior (for an overview, see Gatersleben, et al., 2002). This is amongst other causes also rooted in the matter of fact that self-reported behavior reflects a person's perception or beliefs about his/her behavior rather than his/her actual behavior. Response biases, such as social desirability, may result in inaccurate reports on actual behavior. The social desirability response bias describes individuals' tendency to respond in a manner that they consider to be socially desirable (Randall & Fernandes, 1991). This means that participants could have denied or mitigated social undesirable behaviors, attitudes, and personality traits and overstated socially desirable ones. However, a simultaneous assessment of different types of energy-friendly behaviors of different consumption domains in terms of real behavior in order to arrive at a comprehensive picture is quite ambitious and hardly feasible.

A main aim of this research project was the identification and characterization of different types of energy consumers that would serve as a basis for the development of tailored intervention strategies. As this first step is completed, it could be further studied to develop several tailored marketing and intervention measures based on the provided information, targeting the specific energy consumer types, and to test them for consumers' responsiveness.

The findings on the application of the *symbolic significance heuristic* provide strong support for the generalization of the symbolic significance fallacy to other energy consumption-related domains. The *symbolic significance heuristic* is based on the assumption that people rely on the symbolic meanings (i.e., symbolic significance) of behavioral attributes that are ascribed by social context (i.e., social interaction) and are related to current social norms.

Therefore, it is self-evident to assume that the *symbolic significance heuristic* might also hold true for judgments on other behaviors that are strongly subject to social expectations and social pressure. The replication of people's application of the *symbolic significance heuristic* for behaviors of other domains that are socially shaped, such as prosocial behavior, could be an interesting topic for future research.

4. Conclusions and Implications for the Development of Effective Interventions to Promote Consumers' Energy-Conservation Efforts

The findings of the present research project have several implications for the development of effective interventions that are targeted to the specific conservation opportunities, needs, desires, and ways of thinking of the different energy consumer types. In the following sections, several targeted strategies to promote energy conservation behavior are discussed with regard to the most promising energy consumer types. A further section elaborates on how the challenges and opportunities arising from people's reliance on symbolic significant behavioral attributes could be adequately addressed and implemented in interventions and communication strategies.

4.1. Emphasis on the Compatibility of Energy Conservation and Self-Interests

Self-interested energy consumer types care about comfort, financial issues, and quality of life; energy conservation behavior is perceived to conflict with these interests. However, there are ways to conserve energy that do not restrict comfort or quality of life, and even entail financial benefits, such as adopting energy-efficiency measures. As the results of the first two studies (cf. Chapter II and Chapter III) indicate, self-interested energy consumer types (i.e., competitors and individualists of the first study and materialists of the second study) are quite willing to adopt energy-efficiency measures due to financial reasons. These efforts might be further increased by, for example, running communication campaigns that provide an overview of conservation measures requiring no restriction in comfort or quality of life. The campaigns could especially point to the compatibility of energy conservation and current lifestyle and stress the financial benefits (Ottman, et al., 2006). The promotion of the adoption of energy-efficiency measures is particularly important as technological improvements in terms of energy efficiency constitute a mainstay in achieving the desired reduction of energy consumption in the scope of the new formulated energy strategy (Bundesrat, 2011a). Generally, energy-efficiency measures were found to be more accepted by the public than curtailment behaviors (Poortinga, et al., 2003; Steg, et al., 2006). However, it lacks the translation into action (cf. Wilson & Dowlatabadi, 2007), which further stresses the need for tailored communication campaigns.

Information campaigns on energy-efficiency measures that emphasize the compatibility of energy conservation and self-interested motives could also motivate consumers, whose energy-efficiency investments are nearly inexistent, to increase their efforts in energy efficiency. For example, the problem-aware well-being-oriented energy consumer falls into this category of energy consumer types. Energy-efficiency measures do not conflict with his craving for comfort and convenience. Thus, given his considerable problem awareness, by explicitly pointing to the possibility of engaging in such conservation measures, they could probably enjoy acceptance. The problem-aware well-being-oriented energy consumer represents the youngest segment. Therefore, with regard to tailoring communication campaigns to reach this consumer, the use of social media could be an interesting option.

4.2. Strengthening of Efficacy Beliefs

The belief that an action is effective in attaining a desired effect is central for the motivation to engage in a specific behavior. Holding positive general attitudes toward energy conservation will be ineffective if a consumer does not believe in his/her own ability to perform a certain conservation behavior (Axelrod & Lehman, 1993), because there is, for example, a lack of knowledge on where to come up with measures or how to implement them. The same is true if a consumer advances the view that his/her own efforts are just a drop into the ocean and cannot change anything (i.e., low personal efficacy beliefs) (Straughan & Roberts, 1999), or if he/she considers the existing conservation measures as ineffective (Martens & Rost, 1998). The problem-aware well-being-oriented energy consumer lacks perceived self-efficacy. This could constitute a certain barrier to engage in behaviors that would be compatible with his desire for comfort, such as energy-efficiency measures, but which he is simply not aware of or about which he does not have enough knowledge to put them into action. Transmission of information through media that points out opportunities for action and gives clearly comprehensible and concrete instructions on how to concretely act could increase the willingness to engage in these conservation efforts. The provision of knowledge on energy conservation measures and concrete information on how to act efficiently could already be initiated on the level of school education.

Regarding purchase-related energy conservation behavior, it is essential that consumers trust in the information provided concerning products' energy friendliness. This information is often communicated by means of product labels. If consumers are skeptical about the truth of an environmental claim, the purchase-related conservation measure might be considered ineffective and the consumer is less willing to demonstrate the corresponding conservation behavior. This could be the case with the selfless inconsequent energy saver because purchase-related conservation efforts are the only behavior types that are comparably poorly pronounced. To (re)create trust in the credibility of product labels and, consequently, in the efficacy of purchase-related conservation measures, it is essential that product labels are awarded and controlled by one single and independent body having no conflicting interests and that exaggerations of product claims are avoided (Teisl, et al., 2008; Thogersen, 2000). Furthermore, as energy-efficiency measures seem to be generally underestimated regarding their efficacy in energy conservation (Attari, et al., 2010) and as there might exist a certain technology aversion (Gardner & Stern, 2002), especially amongst otherwise very energy-friendly or green consumers, consumers could be provided with information on the efficacy (i.e., the energy-saving potential) of energy-efficiency measures by trusted experts. This information could be communicated by salespersons or product brochures directly at the point of sale.

4.3. Establishing Social Norms and Relating Energy-Friendly Behavior to Social Status

Individuals strive to conform to social norms. There were two energy consumer types that perceived considerable social pressure to show energy-friendly behavior: the thrifty energy saver and the problem-aware well-being oriented energy consumer. These two consumer types might prove especially susceptible to interventions focusing on social norms. Interventions based on social norms have been demonstrated to be quite successful (for a review, see Biel & Thogersen, 2007; Schultz, et al., 2007). Besides establishing social norms through general media campaigns, consumers could be motivated to make a public commitment to conserve energy. Thereby, social expectations are created which consumers aim to meet and they consequently increase conservation efforts. Another approach that relies on consumers perceived social pressure and also on their competitive thinking is to provide consumers with comparative feedback indicating consumers' performance relative to others (for a review, see Abrahamse, et al., 2005). This strategy could also foster energy conservation behavior of individuals that are, by nature, competitive.

Energy-related behaviors have a more or less significant symbolic meaning that is generally agreed upon. Based on this symbolic meaning, people draw inferences on a consumer's personality (Sadalla & Krull, 1995; Skippon & Garwood, 2011). As the theory of competitive altruism described above suggests, people's desire to hold a certain reputation or status through social approval of their efforts could also be a driver for energy-friendly behavior (Van Vugt, et al., 2007). The studies on the *symbolic significance heuristic* provided strong support that people rely on behaviors that are of high symbolic significance when judging a person's personality. This also includes attribution of a certain reputation. As certain behaviors serve as a signal for energy friendliness, the strong symbolic meaning of such behaviors could be further emphasized through, for example, advertisement. Additionally, the ascription of a desired status related to engagement in this behavior could be highlighted (cf. Ottman, et al., 2006). Already previous research on car purchase and car use has pointed out the importance of symbolic meaning and indicated that the symbolic meaning assigned to a car and to the value of fuel economy is more important than financial motives. This leads to the conclusion that economic rationality is not a sufficient behavioral model for policymaking (Turrentine & Kurani, 2007). Previous research has also stressed the notion of linking green purchase behavior, more precisely green products, to status, showing that activating status motives results in increased green purchase behavior (Griskevicius, et al., 2010).

Furthermore, another crucial point to possibly increase adoption of energy-efficiency measures of poor performers who savor luxury and strive for prestige is to design advertisement campaigns in a way that, for example, drivers of energy-friendly cars are no longer perceived as tree huggers, but as future-oriented, modern and interested in technological innovation (cf. Heffner, et al., 2007). Furthermore, it is preferable to talk about "fuel efficiency" and not "fuel economy" (Turrentine & Kurani, 2007).

4.4. Consideration of Possible Cutbacks of People's Reliance on Symbolic Significant Behaviors

People's reliance on symbolic significant behavior not only provides starting points to promote energy conservation as described above, but also results in possible cutbacks because this way of thinking might exert a negative influence on people's own energy consumption behavior. People could also tend to focus on symbolic significant behavior with regard to their own consumption behavior. If they engage in a symbolic significant energy conservation behavior, such as driving an energy-friendly car, they could simultaneously neglect other crucial but less symbolic significant behaviors, such as the distance covered by car. Due to the one-sided focus on consumption behaviors, the negative less symbolic significant behavior could be intensified. Thus, the gains from the positive symbolic significant energy conservation behavior could be neutralized or overall energy consumption could even be increased. In the latter case, reliance on symbolic significant behaviors would have a certain rebound effect (Hertwich, 2005). Another challenge arising from the reliance on symbolic significant behaviors could be that people perceive engagement in symbolic significant conservation behaviors as legitimization to reduce their efforts with regard to other energy-friendly behaviors (cf. Mazar & Zhong, 2010).

To counteract the possible negative effects of the *symbolic significance heuristic*, it is important to devote more attention to less symbolic consumption and conservation behaviors in communication campaigns. It is crucial to encourage consumers to take a more general and comprehensive look at energy consumption, so that they consider each single behavior that contributes to overall energy consumption and to help them to understand that an integrated and more comprehensive evaluation of all aspects is a prerequisite for engaging in adequate conservation behaviors that lead to an effective reduction in energy consumption.

References

Aarts, H., & Dijksterhuis, A. (2000). The automatic activation of goal-directed behaviour: The case of travel habit. *Journal of Environmental Psychology, 20*(1), 75-82.

Abrahamse, W., & Steg, L. (2009). How do socio-demographic and psychological factors relate to households' direct and indirect energy use and savings? *Journal of Economic Psychology, 30*(5), 711-720. doi: 10.1016/j.joep.2009.05.006

Abrahamse, W., Steg, L., Vlek, C., & Rothengatter, T. (2005). A review of intervention studies aimed at household energy conservation. *Journal of Environmental Psychology, 25*(3), 273-291. doi: 10.1016/j.jenvp.2005.08.002

Ahmadi, M. (2009). Die Zukunft in der Tasche [The future in the bag]. (UD-1010-D). From Bundesamt für Umwelt (BAFU) [Federal Office for Environment (FOEN)] http://www.bafu.admin.ch/publikationen/publikation/01056/index.html?lang=de

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211. doi: 10.1016/0749-5978(91)90020-t

Akademien der Wissenschaften Schweiz. (2012). Zukunft Stromversorgung Schweiz [The future of electricity supply in Switzerland]. Bern: Akademien der Wissenschaften Schweiz.

Andersson, G., Boulouchos, K., & Bretschger, L. (2011). Energiezukunft Schweiz [Energy Future Switzerland]: Energy Science Center, ETH Zurich.

Asif, M., & Muneer, T. (2007). Energy supply, its demand and security issues for developed and emerging economies. *Renewable & Sustainable Energy Reviews, 11*(7), 1388-1413. doi: 10.1016/j.rser.2005.12.004

Attari, S. Z., DeKay, M. L., Davidson, C. I., & de Bruin, W. B. (2010). Public perceptions of energy consumption and savings. *Proceedings of the National Academy of Sciences of the United States of America, 107*(37), 16054-16059. doi: 10.1073/pnas.1001509107

Axelrod, L. J., & Lehman, D. R. (1993). Responding to environmental concerns: What factors guide individual action? *Journal of Environmental Psychology, 13*(2), 149-159.

Backhaus, K., Erichson, B., Plinke, W., & Weiber, R. (2003). *Multivariate Analysemethoden [Multivariate Methods of Analysis]*. Berlin: Springer.

BAFU. (2006). *Umweltbewusster Konsum: Schlüsselentscheide, Akteure und Konsummodelle [Green consumption: Key decisions, actors, and consumption models].* Bern: Bundesamt für Umwelt (BAFU).

Baird, J. C., & Brier, J. M. (1981). Perceptual awareness of energy-requirements of familiar objects. *Journal of Applied Psychology, 66*(1), 90-96. doi: 10.1037//0021-9010.66.1.90

Balliet, D., Parks, C., & Joireman, J. (2009). Social value orientation and cooperation in social dilemmas: A meta-analysis. *Group Processes & Intergroup Relations, 12*(4), 533-547. doi: 10.1177/1368430209105040

Bamberg, S., & Möser, G. (2007). Twenty years after Hines, Hungerford, and Tomera: A new meta-analysis of psycho-social determinants of pro-environmental behaviour. *Journal of Environmental Psychology, 27*, 14-25.

Bamberg, S., & Schmidt, P. (2003). Incentives, morality, or habit? Predicting students' car use for university routes with the models of Ajzen, Schwartz, and Triandis. *Environment and Behavior, 35*(2), 264-285. doi: 10.1177/0013916502250134

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191-215.

Bargh, J. A., Bond, R. N., Lombardi, W. J., & Tota, M. E. (1986). The additive nature of chronic and temporary sources of construct accessibility. *Journal of Personality and Social Psychology, 50*(5), 869-878. doi: 10.1037//0022-3514.50.5.869

Barr, S., Gilg, A. W., & Ford, N. (2005). The household energy gap: Examining the divide between habitual- and purchase-related conservation behaviours. *Energy Policy, 33*(11), 1425-1444. doi: 10.1016/j.enpol.2003.12.016

Baumeister, R. F. (1982). A self-presentational view of social phenomena. *Psychological Bulletin, 91*(1), 3-26. doi: 10.1037//0033-2909.91.1.3

BFE. Fahrzeugliste der Neuwagenmodelle [Vehicle list of new vehicle models] Retrieved February 2, 2011, from http://www.bfe.admin.ch/energieetikette/00962/00964/index.html?lang=de

BFE. (2011a). *Grafiken der Elektrizitätsstatistik 2010 [Graphs of the electricity statistics 2010].* Bern: Bundesamt für Energie (BFE).

BFE. (2011b). *Schweizerische Gesamtenergiestatistik 2010 [Swiss overall energy statistics 2010].* Bern: Bundesamt für Energie (BFE).

BFS. (2009). *Statistisches Lexikon der Schweiz (ESPOP) [The Statistical Encyclopedia].* Neuchâtel: Bundesamt für Statistik.

Biel, A., & Thogersen, J. (2007). Activation of social norms in social dilemmas: A review of the evidence and reflections on the implications for environmental behaviour. *Journal of Economic Psychology, 28*(1), 93-112. doi: 10.1016/j.joep.2006.03.003

Black, J. S., Stern, P. C., & Elworth, J. T. (1985). Personal and contextual influences on household energy adaptations. *Journal of Applied Psychology, 70*(1), 3-21.

Blake, J. (1999). Overcoming the 'value-action gap' in environmental policy: Tensions between national policy and local experience. *Local Environment: The International Journal of Justice and Sustainability, 4*(3), 257-278.

Blumer, H. (1969). *Symbolic interactionism - perspective and method*. Berkeley, CA: University of California Press.

Bogaert, S., Boone, C., & Declerck, C. (2008). Social value orientation and cooperation in social dilemmas: A review and conceptual model. *British Journal of Social Psychology, 47*(3), 453-480. doi: 10.1348/014466607x244970

Bonaiuto, M., Bilotta, E., Bonnes, M., Ceccarelli, M., Martorella, H., & Carrus, G. (2008). Local identity and the role of individual differences in the use of natural resources: The case of water consumption. *Journal of Applied Social Psychology, 38*(4), 947-967.

Brandon, G., & Lewis, A. (1999). Reducing household energy consumption: A qualitative and quantitative field study. *Journal of Environmental Psychology, 19*, 75-85.

Bundesrat. (2011a). *Energieperspektiven 2050 - Analyse der Stromangebotsvarianten des Bundesrats: Faktenblatt [Energy perspectives 2050 - Federal Council's analysis of the options for provision of electricity: Fact sheet].* Bern: Schweizerischer Bundesrat.

Bundesrat. (2011b). *Federal Council decides to gradually phase out nuclear energy as part of its new energy strategy.* Retrieved March 23, 2012, from Bundesamt für Energie (BFE) [Swiss Federal Office of Energy (SFOE)] http://www.bfe.admin.ch/energie/00588/00589/00644/index.html?lang=en&msg-id=39337

Cameron, L. D., Brown, P. M., & Chapman, J. G. (1998). Social value orientations and decisions to take proenvironmental action. *Journal of Applied Social Psychology, 28*(8), 675-697.

Charon, J. M. (2007). *Symbolic interactionism: An introduction, an interpretation, an integration* (9th ed.). Upper Saddel River, New Jersey: Pearson Education.

Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1991). A focus theory of normative conduct: A theoretical refinement and reevaluation of the role of norms in human behavior. *Advances in Experimental Social Psychology, 24*, 201-234.

Collins, C. M., & Chambers, S. M. (2005). Psychological and situational influences on commuter-transport-mode choice. *Environment and Behavior, 37*(5), 640-661. doi: 10.1177/0013916504265440

CORE. (2011). *Konzept der Energieforschung des Bundes 2013-2016 [Federal energy research concept 2013-2016].* Bern: Eidgenössische Energieforschungskommission CORE.

Cornelissen, G., Pandelaere, M., Warlop, L., & Dewitte, S. (2008). Positive cueing: Promoting sustainable consumer behavior by cueing common environmental behaviors as environmental. *International Journal of Research in Marketing, 25*(1), 46-55. doi: 10.1016/j.ijresmar.2007.06.002

Corraliza, J. A., & Berenguer, J. (2000). Environmental values, beliefs, and actions: A situational approach. *Environment and Behavior, 32*(6), 832-848.

Cosmides, L., & Tooby, J. (2006). Evolutionary psychology, moral heuristics, and the law. In G. Gigerenzer & C. Engel (Eds.), *Heuristics and the law* (pp. 175-205). Cambridge, MA: MIT Press.

Davis, L. D., & Rubin, R. S. (1983). Identifying the energy conscious consumer: The case of the opinion leader. *Journal of the Academy of Marketing Science, 11*(2), 169-190.

Dawes, R. M. (1980). Social dilemmas. *Annual Review of Psychology, 31*, 169-193.

De Young, R. (2000). Expanding and evaluating motives for environmentally responsible behavior. *Journal of Social Issues, 56*(3), 509-526.

Deci, E. L. (1971). Effects of externally mediated rewards on intrinsic motivation. *Journal of Personality and Social Psychology, 18*(1), 105-115.

Diamantopoulos, A., Schlegelmilch, B. B., Sinkovics, R. R., & Bohlen, G. M. (2003). Can socio-demographics still play a role in profiling green consumers? A review of the evidence and an empirical investigation. *Journal of Business Research, 56*(6), 465-480. doi: 10.1016/s0148-2963(01)00241-7

Diaz-Rainey, I., & Ashton, J. K. (2010). Profiling potential green electricity tariff adopters: Green consumerism as an environmental policy tool? *Business Strategy and the Environment*.

Diekmann, A., & Meyer, R. (2008). *Klimawandel, ökologische Risiken und Umweltbewusstsein in der Schweizerischen Bevölkerung. Kurzbericht. [Climate change, ecological risks and environmental awareness in the Swiss public. Short report.].* Zurich: Chair of Sociology, ETH Zurich.

Diekmann, A., & Preisendörfer, P. (1992). Persönliches Umweltverhalten: Diskrepanz zwischen Anspruch und Wirklichkeit [Ecology in everyday life: Inconsistencies between environmental attitudes and behavior]. *Kölner Zeitschrift für Soziologie und Sozialpsychologie, 44*(2), 226-251.

Diekmann, A., & Preisendörfer, P. (2003). Green and greenback: The behavioral effects of environmental attitudes in low-cost and high-cost situations. *Rationality and Society, 15*(4), 441-472. doi: 10.1177/1043463103154002

Dillman, D. A., Rosa, E. A., & Dillman, J. J. (1983). Lifestyle and home energy-conservation in the United States: The poor accept lifestyle cutbacks while the wealthy invest in conservation. *Journal of Economic Psychology, 3*(3-4), 299-315.

do Paco, A., & Raposo, M. (2009). "Green" segmentation: An application to the Portuguese consumer market. *Marketing Intelligence & Planning, 27*(3), 364-379.

Dones, R., Heck, T., & Hirschberg, S. (2004). Greenhouse gas emissions from energy systems, comparison and overview. In C. C. (Ed.), *Encyclopedia of Energy* (Vol. 3, pp. 77-95). San Diego, USA: Academic Press/Elsevier.

Downs, P. E., & Freiden, J. B. (1983). Investigating potential market segments for energy conservation strategies. *Journal of Public Policy & Marketing, 2*, 136-152.

Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). Measuring endorsement of the new ecological paradigm: A revised NEP scale. *Journal of Social Issues, 56*(3), 425-442. doi: 10.1111/0022-4537.00176

EcoSpeed. ECO2-Rechner [ECO2-Calculator]. Retrieved February, 2011, from http://eco5.ecospeed.ch/privat/

Egmond, C., Jonkers, R., & Kok, G. (2006). One size fits all? Policy instruments should fit the segments of target groups. *Energy Policy, 34*(18), 3464-3474.

Eimers, M. Y., & Pieters, R. (2002). Value segmentation for the environment: Implications for public policy from experiences in marketing. In G. Bartels & W. Nelissen (Eds.), *Martketing for sustainability* (pp. 128-140). Amsterdam: IOS Press.

Faiers, A., Cook, M., & Neame, C. (2007). Towards a contemporary approach for understanding consumer behaviour in the context of domestic energy use. *Energy Policy, 35*(8), 4381-4390. doi: 10.1016/j.enpol.2007.01.003

Frey, B. S., & Stutzer, A. (2008). Environmental morale and motivation. In A. Lewis (Ed.), *The Cambridge handbook of psychology and economic behaviour* (pp. 406-428). Cambridge, UK: Cambridge University Press.

Gardner, G. T., & Stern, P. C. (2002). *Environmental problems and human behavior* (2nd ed.). Boston, MA: Pearson Custom Publishing.

Gärling, T. (1999). Value priorities, social value orientations and cooperation in social dilemmas. *British Journal of Social Psychology, 38*, 397-408.

Gärling, T., Fujii, S., Gärling, A., & Jakobsson, C. (2003). Moderating effects of social value orientation on determinants of proenvironmental behavior intention. *Journal of Environmental Psychology, 23*(1), 1-9.

Gatersleben, B. (2001). Sustainable household consumption and quality of life: The acceptability of sustainable consumption patterns and consumer policy strategies. *International Journal of Environment and Pollution, 15*(2), 200-216.

Gatersleben, B., Steg, L., & Vlek, C. (2002). Measurement and determinants of environmentally significant consumer behavior. *Environment and Behavior, 34*(3), 335-362. doi: 10.1177/0013916502034003004

Gigerenzer, G. (2010). Moral satisficing: Rethinking moral behavior as bounded rationality. *Topics in Cognitive Science, 2*(3), 528-554. doi: 10.1111/j.1756-8765.2010.01094.x

Gigerenzer, G., & Gaissmaier, W. (2011). Heuristic decision making. *Annual Review of Psychology, 62*, 451-482.

Gilg, A., Barr, S., & Ford, N. (2005). Green consumption or sustainable lifestyles? Identifying the sustainable consumer. *Futures, 37*(6), 481-504. doi: 10.1016/j.futures.2004.10.016

Goffman, E. (1979). *Gender advertisements*. Cambridge, Massachusetts: Harvard University Press.

Goldstein, N. J., Cialdini, R. B., & Griskevicius, V. (2008). A room with a viewpoint: Using social norms to motivate environmental conservation in hotels. *Journal of Consumer Research, 35*(3), 472-482. doi: 10.1086/586910

Griskevicius, V., Tybur, J. M., & Van den Bergh, B. (2010). Going green to be seen: Status, reputation, and conspicuous conservation. *Journal of Personality and Social Psychology, 98*(3), 392-404. doi: 10.1037/a0017346

Guagnano, G. A., Stern, P. C., & Dietz, T. (1995). Influences on attitude-behavior relationships: A natural experiment with curbside recycling. *Environment and Behavior, 27*(5), 699-718. doi: 10.1177/0013916595275005

Gupta, S., & Ogden, D. T. (2009). To buy or not to buy? A social dilemma perspective on green buying. *Journal of Consumer Marketing, 26*(6), 376-391.

Hardin, G. (1968). The tragedy of the commons. *Science, 162*(3859), 1243-1248.

Heffner, R. R., Kurani, K. S., & Turrentine, T. S. (2007). Symbolism in California's early market for hybrid electric vehicles. *Transportation Research Part D-Transport and Environment, 12*(6), 396-413. doi: 10.1016/j.trd.2007.04.003

Hemauer, C., & Keller, R. (Producer), & Hemauer, C., & Keller, R. (Director). (2010). *A road not taken* [Documentary]. Switzerland.

Hertwich, E. G. (2005). Consumption and the rebound effect: An industrial ecology perspective. [Article]. *Journal of Industrial Ecology, 9*(1-2), 85-98. doi: 10.1162/1088198054084635

Hsee, C. K. (1996). The evaluability hypothesis: An explanation for preference reversals between joint and separate evaluations of alternatives. *Organizational Behavior and Human Decision Processes, 67*(3), 247-257. doi: 10.1006/obhd.1996.0077

Hunecke, M., Haustein, S., Bohler, S., & Grischkat, S. (2010). Attitude-based target groups to reduce the ecological impact of daily mobility behavior. *Environment and Behavior, 42*(1), 3-43. doi: 10.1177/0013916508319587

IEA. (2011). World Energy Outlook 2011: Executive summary. Paris, France: OECD/IEA.

Jackson, T. (2005). *Motivating sustainable consumption: A review of evidence on consumer behaviour and behavioural change.* Guildford (UK): University of Surrey.

Jansson, J., Marell, A., & Nordlund, A. (2009). Elucidating green consumers: A cluster analytic approach on proenvironmental purchase and curtailment behaviors. *Journal of Euromarketing, 18*(4), 245-267.

Jarvis, C. B., MacKenzie, S. B., & Podsakoff, P. M. (2003). A critical review of construct indicators and measurement model misspecification in marketing and consumer research. *Journal of Consumer Research, 30*(2), 199-218. doi: 10.1086/376806

Joireman, J. A., Lasane, T. P., Bennett, J., Richards, D., & Solaimani, S. (2001). Integrating social value orientation and the consideration of future consequences within the extended norm activation model of proenvironmental behaviour. *British Journal of Social Psychology, 40*, 133-155.

Joireman, J. A., Van Lange, P. A. M., Kuhlman, D. M., Van Vugt, M., & Shelley, G. P. (1997). An interdependence analysis of commuting decisions. *European Journal of Social Psychology, 27*(4), 441-463.

Joireman, J. A., Van Lange, P. M., & Van Vugt, M. (2004). Who cares about the environmental impact of cars? Those with an eye toward the future. *Environment and Behavior, 36*(2), 187-206. doi: 10.1177/0013916503251476

Jones, E. E., & Davis, K. E. (1965). From acts to dispositions: The attribution process in person perception. *Advances in Experimental Social Psychology, 2*(4), 219-266.

Kahneman, D. (2003). A perspective on judgment and choice: Mapping bounded rationality. *American Psychologist, 58*(9), 697-720. doi: 10.1037/0003-066x.58.9.697

Kahneman, D., & Frederick, S. (2002). Representativeness revisited: Attribute substitution in intuitive judgment. In T. Gilovich, D. W. Griffin & D. Kahneman (Eds.), *Heuristics and biases: The psychology of intuitive judgment* (pp. 49-81). Cambridge: Cambridge University Press.

Kahneman, D., & Frederick, S. (2005). A model of heuristic judgment. In K. J. Holyoak & R. G. Morrison (Eds.), *The Cambridge handbook of thinking and reasoning*. Cambridge, UK: Cambridge University Press.

Kaiser, F. G. (1998). A general measure of ecological behavior. *Journal of Applied Social Psychology, 28*(5), 395-422.

Kaiser, F. G., & Gutscher, H. (2003). The proposition of a general version of the theory of planned behavior: Predicting ecological behavior. *Journal of Applied Social Psychology, 33*(3), 586-603.

Kaiser, F. G., Hubner, G., & Bogner, F. X. (2005). Contrasting the theory of planned behavior with the value-belief-norm model in explaining conservation behavior. *Journal of Applied Social Psychology, 35*(10), 2150-2170.

Kempton, W., Harris, C. K., Keith, J. G., & Weihl, J. S. (1984). Do consumers know what works in energy conservation? In J. Harris & C. Blumstein (Eds.), *What works: Documenting energy conservation in buildings* (pp. 429-438). Washington, D.C: American Council for an Energy Efficient Economy.

Kempton, W., & Montgomery, L. (1982). Folk quantification of energy. *Energy, 7*(10), 817-827. doi: 10.1016/0360-5442(82)90030-5

Kinnear, T. C., Taylor, J. R., & Ahmed, S. A. (1974). Ecologically concerned consumers: Who are they? *Journal of Marketing, 38*(2), 20-24. doi: 10.2307/1250192

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research, 8*(3), 239-260.

Kramer, R. M., McClintock, C. G., & Messick, D. M. (1986). Social values and cooperative response to a simulated resource conservation crisis. *Journal of Personality, 54*(3), 576-592.

Kuhlman, D. M., Camac, C., & Cunha, D. A. (1986). Individual differences in social orientation. In H. Wilke, D. Messick & C. Rutte (Eds.), *Experimental social dilemmas* (pp. 151-176). New York: Verlag.

Kuhlman, D. M., & Marshello, A. F. J. (1975). Individual-differences in game motivation as moderators of preprogrammed strategy effects in prisoners dilemma. *Journal of Personality and Social Psychology, 32*(5), 922-931.

Kulik, J. A. (1983). Confirmatory attribution and the perpetuation of social beliefs. *Journal of Personality and Social Psychology, 44*(6), 1171-1181. doi: 10.1037/0022-3514.44.6.1171

Lam, S. P. (2006). Predicting intention to save water: Theory of planned behavior, response efficacy, vulnerability, and perceived efficiency of alternative solutions. *Journal of Applied Social Psychology, 36*(11), 2803-2824. doi: 10.1111/j.0021-9029.2006.00129.x

Liebrand, W. B. G., & Van Run, G. J. (1985). The effects of social motives on behavior in social dilemmas in two cultures. *Journal of Experimental Social Psychology, 21*, 86-102.

Lindenberg, S., & Steg, L. (2007). Normative, gain and hedonic goal frames guiding environmental behavior. *Journal of Social Issues, 63*(1), 117-137.

Lindsay, J. J., & Strathman, A. (1997). Predictors of recycling behavior: An application of a modified health belief model. *Journal of Applied Social Psychology, 27*(20), 1799-1823.

Long, J. E. (1993). An econometric analysis of residential expenditures on energy conservation and renewable energy sources. *Energy Economics, 15*(4), 232-238.

Lorek, S., & Spangenberg, J. H. (2001). Indicators for environmentally sustainable household consumption. *International Journal of Sustainable Development, 4*(1), 101-120.

Lutzenhiser, L. (1993). Social and behavioral aspects of energy use. *Annual Review of Energy and the Environment, 18*, 247-289.

Marechal, K. (2009). An evolutionary perspective on the economics of energy consumption: The crucial role of habits. *Journal of Economic Issues, 43*(1), 69-88. doi: 10.2753/jei0021-3624430104

Martens, T., & Rost, J. (1998). Der Zusammenhang von wahrgenommener Bedrohung durch Umweltgefahren und der Ausbildung von Handlungsintentionen [The relationship between the perceived threat of environmental problems and the formation of action intentions]. *Zeitschrift für Experimentelle Psychologie, 45*(4), 345-364.

Mazar, N., & Zhong, C. B. (2010). Do green products make us better people? *Psychological Science, 21*(4), 494-498. doi: 10.1177/0956797610363538

McClintock, C. G., & Allison, S. T. (1989). Social value orientation and helping behavior. *Journal of Applied Social Psychology, 19*(4), 353-362.

McClintock, C. G., & Liebrand, W. B. G. (1988). Role of interdependence structure, individual value orientation, and another's strategy in social decision making: A transformational analysis. *Journal of Personality and Social Psychology, 55*(3), 396-409.

McCracken, G. (1986). Culture and consumption: A theoretical account of the structure and movement of the cultural meaning of consumer-goods. *Journal of Consumer Research, 13*(1), 71-84. doi: 10.1086/209048

Mead, G. (1934). *Mind, self, and society*. Chicago: University of Chicago Press.

Messick, D. M., & Brewer, M. B. (1983). Solving social dilemmas: A review. In L. Wheeler & P. Shaver (Eds.), *Review of personality and social psychology* (Vol. 4, pp. 11-44). Beverly Hills, California: Sage.

Messick, D. M., & McClintock, C. G. (1968). Motivational bases of choice in experimental games. *Journal of Experimental Social Psychology, 4*(1), 1-25.

Monroe, A. E., & Reeder, G. D. (2011). Motive-matching: Perceptions of intentionality for coerced action. *Journal of Experimental Social Psychology, 47*(6), 1255-1261. doi: 10.1016/j.jesp.2011.05.012

Morris, M. W., & Larrick, R. P. (1995). When one cause casts doubt on another: A normative analysis of discounting in causal attribution. *Psychological Review, 102*(2), 331-355. doi: 10.1037//0033-295x.102.2.331

Morrison, B. M., & Gladhart, P. M. (1976). Energy and families: The crisis and the response. *Journal of Home Economics, 68*, 15-18.

Morton, C., Schuitema, G., & Anable, J. (2011). *Electric vehicles: Will consumers get charged up?* Paper presented at the 43rd Annual UTSG Conference, Milton Keynes, United Kingdom.

Murphy, R. O., & Ackermann, K. A. (2012). *A review of measurement methods for social preferences*. Manuscript submitted for publication.

Nickerson, R. S. (1998). Confirmation bias; A ubiquitous phenomenon in many guises. *Review of General Psychology, 2*(2), 175-220.

Nye, M., & Hargreaves, T. (2010). Exploring the Social Dynamics of Proenvironmental Behavior Change: A Comparative Study of Intervention Processes at Home and Work. *Journal of Industrial Ecology, 14*(1), 137-149.

Ölander, F., & Thogersen, J. (1995). Understanding of consumer behaviour as a prerequisite for environmental protection. *Journal of Consumer Policy, 18*(4), 345-385.

Olli, E., Grendstad, G., & Wollebaek, D. (2001). Correlates of environmental behaviors: Bringing back social context. *Environment and Behavior, 33*(2), 181-208.

Olsen, M. E. (1983). Public acceptance of consumer energy-conservation strategies. *Journal of Economic Psychology, 4*(1-2), 183-196.

Ottman, J. A., Stafford, E. R., & Hartman, C. L. (2006). Avoiding green marketing myopia: Ways to improve consumer appeal for environmentally preferable products. *Environment, 48*(5), 22-36. doi: 10.3200/envt.48.5.22-36

Parks, C. D. (1994). The predictive ability of social values in resource dilemmas and public goods games. *Personality and Social Psychology Bulletin, 20*(4), 431-438.

Peattie, K. (1995). *Environmental Marketing Management: Meeting the Green Challenge*. London: Pitman Publishing.

Peattie, K. (2001). Golden goose or wild goose? The hunt for the green consumer. *Business Strategy and the Environment, 10*, 187-199.

Pedersen, L. H. (2000). The dynamics of green consumption: A matter of visibility? *Journal of Environmental Policy and Planning, 2*(3), 193-210.

Peters, A., Gutscher, H., & Scholz, R. W. (2011). Psychological determinants of fuel consumption of purchased new cars. *Transportation Research Part F-Traffic Psychology and Behaviour, 14*(3), 229-239. doi: 10.1016/j.trf.2011.01.003

Petkus, E. (1992). Implications of the symbolic interactionist perspective for the study of environmentally-responsible consumption. In J. F. Sherry & B. Sternthal (Eds.), *Advances in consumer research* (Vol. 19, pp. 861-869). Provo, UT: Association for Consumer Research.

Piskernik, L. (2008). Evaluation von Bildungsmaßnahmen zur Erhöhung des energierelevanten Kenntnisstandes [Evaluation of educational measures designed to increase energy-related knowledge]. *Umweltpsychologie, 12*(2), 91-104.

Platow, M. J. (1994). An evaluation of the social desirability of prosocial self-other allocation choices. *Journal of Social Psychology, 134*(1), 61-68.

Poortinga, W., Steg, L., & Vlek, C. (2004). Values, environmental concern, and environmental behavior: A study into household energy use. *Environment and Behavior, 36*(1), 70-93. doi: 10.1177/0013916503251466

Poortinga, W., Steg, L., Vlek, C., & Wiersma, G. (2003). Household preferences for energy-saving measures: A conjoint analysis. *Journal of Economic Psychology, 24*(1), 49-64.

Prognos. (2011). *Zwischenbericht II: Energieszenarien für die Schweiz bis 2050 [Interim report II: Energy scenarios for Switzerland up to 2050].* Basel: Prognos AG.

Prose, F., & Wortmann, K. (1991). *Energiesparen: Verbraucheranalyse und Marktsegmentierung der Kieler Haushalte (Endbericht) [Energy Conservation: Consumer Analysis and Market Segmentation of Households in Kiel (Final Report)]*. Kiel: Stadtwerke.

Randall, D. M., & Fernandes, M. F. (1991). The social desirability response bias in ethics research. *Journal of Business Ethics, 10*(11), 805-817.

Rhodes, S. D., Bowie, D. A., & Hergenrather, K. C. (2003). Collecting behavioural data using the world wide web: considerations for researchers. *Journal of Epidemiology and Community Health, 57*(1), 68-73. doi: 10.1136/jech.57.1.68

Roberts, J. A. (1995). Profiling levels of socially responsible consumer behavior: A cluster analytic approach and its implications for marketing. *Journal of Marketing Theory and Practice, 3*(4), 97-117.

Roberts, J. A. (1996). Green consumers in the 1990s: Profile and implications for advertising. *Journal of Business Research, 36*(3), 217-231.

Rogers, E. M. (1995). *Diffusion of Innovations* (fourth ed.). New York: The Free Press.

Rogers, R. W. (1975). A protection motivation theory of fear appeals and attitude change. *The Journal of Psychology, 91*(1), 93-114.

Ross, L. (1977). The intuitive psychologist and his shortcomings: Distortions in the attribution process. In L. Berkowitz (Ed.), *Advances in Experimental Social Psychology* (Vol. 10, pp. 173-220). New York: Academic Press.

Rosset, E. (2008). It's no accident: Our bias for intentional explanations. *Cognition, 108*(3), 771-780. doi: 10.1016/j.cognition.2008.07.001

Rossiter, J. R., & Percy, L. (1987). *Advertising and Promotion Management*. New York: McGraw-Hill.

Rowlands, I. H., Scott, D., & Parker, P. (2003). Consumers and green electricity: Profiling potential purchasers. *Business Strategy and the Environment, 12*(1), 36-48.

Sadalla, E. K., & Krull, J. L. (1995). Self-presentational barriers to resource conservation. *Environment and Behavior, 27*(3), 328-353. doi: 10.1177/0013916595273004

Saidur, R., Masjuki, H. H., & Jamaluddin, M. Y. (2007). An application of energy and exergy analysis in residential sector of Malaysia. *Energy Policy, 35*(2), 1050-1063. doi: 10.1016/j.enpol.2006.02.006

Sammer, K., & Wuestenhagen, R. (2006). Der Einfluss von Oeko-Labelling auf das Konsumentenverhalten - ein Discrete Choice Experiment zum Kauf von Gluehbirnen [The influence of eco-labelling on consumer behaviour - a discrete choice experiment on the purchase of light bulbs]. In R. Pfriem, R. Antes, K. Fichter, M. Müller, N. Paech, S. Seuring & B. Siebenhüner (Eds.), *Innovationen für eine nachhaltige Entwicklung* (pp. 469-487). Wiesbaden: Deutscher Universitäts-Verlag (DUV).

Samuelson, C. D. (1990). Energy conservation: A social dilemma approach. *Social Behaviour, 5*(4), 207-230.

Samuelson, C. D., & Biek, M. (1991). Attitudes toward energy conservation: A confirmatory factor-analysis. *Journal of Applied Social Psychology, 21*(7), 549-568.

Sardianou, E. (2007). Estimating energy conservation patterns of Greek households. *Energy Policy, 35*(7), 3778-3791. doi: 10.1016/j.enpol.2007.01.020

Schipper, L., Bartlett, S., Hawk, D., & Vine, E. (1989). Linking life-styles and energy use: A matter of time? *Annual Review of Energy, 14*, 273-320.

Schlegelmilch, B. B., Bohlen, G. M., & Diamantopoulos, A. (1996). The link between green purchasing decisions and measures of environmental consciousness. *European Journal of Marketing, 30*(5), 35-55.

Schuitema, G., & Steg, L. (2005). Percepties van energieverbruik van huishoudelijke apparaten [Perception of Energy Use of Domestic Appliances]. In A. E. Bronner, P. Dekker, E. de Leeuw, K. de Ruyter, A. Smidts & J. E. Wieringa (Eds.), *Ontwikkelingen in het marktonderzoek. Jaarboek 2005 (Developments in Marketing Research. Yearbook 2005)* (pp. 165-180). Haarlem (NL): De Vrieseborch.

Schultz, P. W., Nolan, J. M., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2007). The constructive, destructive and reconstructive power of social norms. *Psychological Science, 18*(5), 429-434. doi: 10.1111/j.1467-9280.2007.01917.x

Schwartz, S. H. (1977). Normative influence on altruism. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 10, pp. 221-279). New York: Academic Press.

Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. *Advances in Experimental Social Psychology, 25*, 1-65.

Sinnott-Armstrong, W., Young, L., & Cushman, F. (2010). Moral intuitions. In Doris, J. M. & The Moral Psychology Research Group (Eds.), *The moral psychology handbook* (pp. 246-273). Oxford: Oxford University Press.

Skippon, S., & Garwood, M. (2011). Responses to battery electric vehicles: UK consumer attitudes and attributions of symbolic meaning following direct experience to reduce psychological distance. *Transportation Research Part D-Transport and Environment, 16*(7), 525-531. doi: 10.1016/j.trd.2011.05.005

Slovic, P., Finucane, M. L., Peters, E., & MacGregor, D. G. (2007). The affect heuristic. [Reprint]. *European Journal of Operational Research, 177*(3), 1333-1352. doi: 10.1016/j.ejor.2005.04.006

Smeesters, D., Novoseltsev, A., & Warlop, L. (2001) Heterogeneity in sustainable consumption: A segmentation analysis of waste sorting behavior. *OSTC Research Report*. Brussels: OSTC.

Steg, L. (2005). Car use: lust and must. Instrumental, symbolic and affective motives for car use. *Transportation Research Part a-Policy and Practice, 39*(2-3), 147-162. doi: 10.1016/j.tra.2004.07.001

Steg, L. (2008). Promoting household energy conservation. *Energy Policy, 36*(12), 4449-4453.

Steg, L., Dreijerink, L., & Abrahamse, W. (2005). Factors influencing the acceptability of energy policies: A test of VBN theory. *Journal of Environmental Psychology, 25*(4), 415-425. doi: 10.1016/j.jenvp.2005.08.003

Steg, L., Dreijerink, L., & Abrahamse, W. (2006). Why are energy policies acceptable and effective? *Environment and Behavior, 38*(1), 92-111.

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology, 29*(3), 309-317. doi: 10.1016/j.jenvp.2008.10.004

Stern, P. C. (1992). Psychological dimensions of global environmental change. *Annual Review of Psychology, 43*, 269-302.

Stern, P. C. (1999). Information, incentives, and proenvironmental consumer behavior. *Journal of Consumer Policy, 22*, 461-478.

Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues, 56*(3), 407-424.

Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. *Journal of Social Issues, 50*(3), 65-84.

Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A value-belief-norm theory of support for social movements: The case of environmentalism. *Human Ecology Review, 6*(2), 81-97.

Stern, P. C., & Gardner, G. T. (1981). Psychological research and energy policy. *American Psychologist, 36*(4), 329-342.

Straughan, R. D., & Roberts, J. A. (1999). Environmental segmentation alternatives: A look at green consumer behavior in the new millennium. *Journal of Consumer Marketing, 16*(6), 558-575.

Sunstein, C. R. (2005). Moral heuristics. *Behavioral and Brain Sciences, 28*(4), 531-573.

Sütterlin, B., Brunner, T. A., & Siegrist, M. (2013). Impact of social value orientation on energy conservation in different behavioral domains. *Journal of Applied Social Psychology, 43*(8), 1725-1735.

Swan, L. G., & Ugursal, V. I. (2009). Modeling of end-use energy consumption in the residential sector: A review of modeling techniques. *Renewable & Sustainable Energy Reviews, 13*(8), 1819-1835. doi: 10.1016/j.rser.2008.09.033

Teisl, M. F., Rubin, J., & Noblet, C. L. (2008). Non-dirty dancing? Interactions between eco-labels and consumers. *Journal of Economic Psychology, 29*(2), 140-159.

Thogersen, J. (2000). Psychological determinants of paying attention to eco-labels in purchase decisions: Model development and multinational validation. *Journal of Consumer Policy, 23*, 285-313.

Thogersen, J. (2008). Social norms and cooperation in real-life social dilemmas. *Journal of Economic Psychology, 29*(4), 458-472. doi: 10.1016/j.joep.2007.12.004

Thogersen, J., & Gronhoj, A. (2010). Electricity saving in households - A social cognitive approach. *Energy Policy, 38*(12), 7732-7743. doi: 10.1016/j.enpol.2010.08.025

Thompson, S. C., & Stoutemyer, K. (1991). Water use as a commons dilemma: The effects of education that focuses on long-term consequences and individual action. *Environment and Behavior, 23*(3), 314-333.

Todd, P. M., & Gigerenzer, G. (2000). Precis of Simple heuristics that make us smart. *Behavioral and Brain Sciences, 23*(5), 727-780. doi: 10.1017/s0140525x00003447

Tuchschmid, M. (2010). Umweltfahrplan SBB [Environmental programme SBB]. From http://www.sbb.ch/sbb-konzern/verantwortung-fuer-gesellschaft-und-umwelt/der-umwelt-verpflichtet/nachhaltige-mobilitaet/sbb-umweltrechner.html

Turrentine, T. S., & Kurani, K. S. (2007). Car buyers and fuel economy? *Energy Policy, 35*(2), 1213-1223.

Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology, 5*(2), 207-232.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science, 185*(4157), 1124-1131. doi: 10.1126/science.185.4157.1124

Tversky, A., & Kahneman, D. (1983). Extensional vs. intuitive reasoning: The conjunction fallacy in probability judgment. *Psychological Review, 90*, 293-315.

userlearn. Die bewegte Schweiz [Switzerland in motion]. Retrieved February 2, 2011, from http://www.trussardi.ch/07_spez_strom-online/24bewegte_schweiz/24infotextbilder.html

Van Lange, P. A. M., Agnew, C. R., Harinck, F., & Steemers, G. E. M. (1997). From game theory to real life: How social value orientation affects willingness to sacrifice in ongoing close relationships. *Journal of Personality and Social Psychology, 73*(6), 1330-1344.

Van Lange, P. A. M., Bekkers, R., Schuyt, T. N. M., & Van Vugt, M. (2007). From games to giving: Social value orientation predicts donations to noble causes. *Basic and Applied Social Psychology, 29*(4), 375-384.

Van Lange, P. A. M., De Cremer, D., Van Dijk, E., & Van Vugt, M. (2007). Self-interest and beyond: Basic principles of social interaction. In A. W. Kruglanski & E. T. Higgings (Eds.), *Social psychology: Handbook of basic principles* (2nd ed., pp. 540-561). New York: Guilford.

Van Lange, P. A. M., & Joireman, J. (2008). How we can promote behavior that serves all of us in the future. *Social Issues and Policy Review, 2*(1), 127-157.

Van Lange, P. A. M., & Liebrand, W. B. G. (1991). Social value orientation and intelligence: A test of the goal prescribes rationality principle. *European Journal of Social Psychology, 21*(4), 273-292.

Van Lange, P. A. M., Schippers, M., & Balliet, D. (2011). Who volunteers in psychology experiments? An empirical review of prosocial motivation in volunteering. *Personality and Individual Differences, 51*(3), 279-284. doi: 10.1016/j.paid.2010.05.038

Van Lange, P. A. M., Van Vugt, M., Meertens, R. M., & Ruiter, R. A. C. (1998). A social dilemma analysis of commuting preferences: The roles of social value orientation and trust. *Journal of Applied Social Psychology, 28*(9), 796-820.

Van Vugt, M. (2009). Averting the tragedy of the commons: Using social psychological science to protect the environment. *Current Directions in Psychological Science, 18*(3), 169-173.

Van Vugt, M., Meertens, R. M., & Van Lange, P. A. M. (1995). Car versus public transportation? The role of social value orientations in a real-life social dilemma. *Journal of Applied Social Psychology, 25*(3), 258-278.

Van Vugt, M., Roberts, G., & Hardy, C. (2007). Competitive altruism: Development of reputation-based cooperation in groups. In R. Dunbar & L. Barrett (Eds.), *Oxford handbook of evolutionary psychology* (pp. 531-540). Oxford: Oxford University Press.

Van Vugt, M., Van Lange, P. A. M., & Meertens, R. M. (1996). Commuting by car or public transportation? A social dilemma analysis of travel mode judgements. *European Journal of Social Psychology, 26*(3), 373-395.

Vicente, P., & Reis, E. (2007). Segmenting households according to recycling attitudes in a Portuguese urban area. *Resources Conservation and Recycling, 52*(1), 1-12. doi: 10.1016/j.resconrec.2007.01.005

Visschers, V. H. M., & Siegrist, M. (2013). How a nuclear power plant accident influences acceptance of nuclear power: Results of a longitudinal study before and after the Fukushima Disaster. *Risk Analysis, 33*(2), 333-347. doi: 10.1111/j.1539-6924.2012.01861.x

Vonk, R. (1994). Trait Inferences, Impression Formation, and Person Memory: Strategies in Processing Inconsistent Information about Persons. *European Review of Social Psychology, 5*(1), 111-149. doi: 10.1080/14792779543000039

Walsh, M. J. (1989). Energy tax credits and housing improvement. *Energy Economics, 11*(4), 275-284.

Wardman, J. K. (2006). Toward a critical discourse on affect and risk perception. *Journal of Risk Research, 9*(2), 109-124. doi: 10.1080/13669870500454773

Welte, T. H. L., & Anastasio, P. A. (2010). To conserve or not to conserve: Is status the question? *Environment and Behavior, 42*(6), 845-863. doi: 10.1177/0013916509348461

Wilson, C., & Dowlatabadi, H. (2007). Models of decision making and residential energy use. *Annual Review of Environment and Resources, 32*, 169-203. doi: 10.1146/annurev.energy.32.053006.141137

Wilson, R. S., & Arvai, J. L. (2006). When less is more: How affect influences preferences when comparing low and high-risk options. *Journal of Risk Research, 9*(2), 165-178. doi: 10.1080/13669870500419503

Winett, R. A., Leckliter, I. N., Chinn, D. E., Stahl, B., & Love, S. Q. (1985). Effects of television modeling on residential energy conservation. *Journal of Applied Behavior Analysis, 18*, 33-44.

Wortmann, K., Schuster, K., & Klitzke, M. (1996). Die Konsumentenanalyse: Voraussetzung für die erfolgreiche Konzeption und Vermarktung von Energiedienstleistungen [The consumer analysis: Precondition for a successful conception and marketing of energy services]. In VDI-Gesellschaft Energietechnik (Ed.), *Energiedienstleistung und Marketing* (pp. 17-32). Düsseldorf: VDI-Verlag.

Appendix A

Survey Questionnaire

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Institute for Environmental Decisions (IED)
Consumer Behavior

Wissenschaftliche Umfrage zum

ENERGIEKONSUM

Vielen Dank, dass Sie sich Zeit nehmen und den Fragebogen ausfüllen!

Bitte beachten Sie Folgendes:

- Dieser Fragebogen sollte von derjenigen Person in Ihrem Haushalt ausgefüllt werden, die **als nächste Geburtstag feiert und 18 Jahre oder älter** ist.
- Ihre Antworten werden streng vertraulich und anonym behandelt. Die Identifikationsnummer auf dem Fragebogen dient lediglich der Feststellung, ob Ihr Fragebogen bei uns eingetroffen ist. Die statistischen Auswertungen werden keine Rückschlüsse auf Einzelpersonen zulassen.
- Die gewonnenen Daten werden nur zur wissenschaftlichen, nicht-kommerziellen Forschung und Lehre verwendet.
- Bitte beantworten Sie die Fragen der Reihe nach. Möglicherweise werden Sie den Eindruck haben, dass einige Fragen ähnlich sind. Dies ist absichtlich der Fall. Bitte beantworten Sie trotzdem jede Frage.
- Das Ausfüllen des Fragebogens dauert ca. 30 Minuten.

Da der Fragebogen elektronisch eingelesen wird, bitten wir Sie folgende Hinweise zu beachten:

- Verwenden Sie einen **schwarzen oder blauen Kugelschreiber** (keinen Bleistift).
- Setzen Sie die Kreuzchen deutlich in die **Mitte der Kästchen** und machen Sie die Kreuzchen **nicht zu gross.**
- Lassen Sie bitte keine Frage aus und kreuzen Sie jeweils nur eine Antwort an.
- Falls Sie versehentlich ein falsches Kästchen angekreuzt haben, so machen Sie ein zweites Kreuzchen und **umkreisen** Sie die **gültige Antwort**:

⊠ = gültige Antwort

☒ = ungültige Antwort

Bitte retournieren Sie den ausgefüllten Fragebogen mittels beiliegendem vorfrankierten Antwortcouvert bis spätestens **23. November 2009** direkt an:

ETH Zürich, Institut für Umweltentscheidungen (IED), Consumer Behavior, Studie Energiekonsum, CHN J 75.1 / PF 45 , Universitätstrasse 22, CH-8092 Zürich

1. Bevor wir auf das Thema «Energie» eingehen, möchten wir mit einer ganz allgemeinen Frage beginnen.
Bitten stufen Sie ein, wie wichtig jeder der folgenden Werte als Leitprinzip in Ihrem Leben ist.

	sehr unwichtig					sehr wichtig
	1	*2*	*3*	*4*	*5*	*6*
Eine Welt in Frieden: Frei von Krieg und Konflikt	☐	☐	☐	☐	☐	☐
Soziale Gerechtigkeit: Ungerechtigkeit beseitigen, sich um die Schwachen kümmern	☐	☐	☐	☐	☐	☐
Gleichheit: Gleiche Chancen für alle	☐	☐	☐	☐	☐	☐
Umwelt schützen: Die Natur schützen	☐	☐	☐	☐	☐	☐
Einheit mit der Natur: Einpassung in die Natur	☐	☐	☐	☐	☐	☐
Achtung vor der Erde: Harmonie mit anderen Lebewesen	☐	☐	☐	☐	☐	☐
Ehrerbietig gegenüber Eltern und älteren Menschen: Respektvoll	☐	☐	☐	☐	☐	☐
Familiäre Sicherheit: Sicherheit für die geliebten Personen	☐	☐	☐	☐	☐	☐
Selbstdisziplin: Selbstbeherrschung, Widerstand gegen Versuchung	☐	☐	☐	☐	☐	☐
Autorität: Das Recht zu führen und zu bestimmen	☐	☐	☐	☐	☐	☐
Einflussreich: Einfluss auf Menschen und Ereignisse ausüben	☐	☐	☐	☐	☐	☐
Reichtum: Materieller Besitz, Geld	☐	☐	☐	☐	☐	☐
Ein abwechslungsreiches Leben: Herausforderungen, Neues und Veränderungen	☐	☐	☐	☐	☐	☐
Ein anregendes Leben: Anregende Erfahrungen	☐	☐	☐	☐	☐	☐
Neugierig: Interessiert an allem, erkunden	☐	☐	☐	☐	☐	☐
Gesundheit: Körperliches Wohlbefinden	☐	☐	☐	☐	☐	☐
Luxus: Komfort, Exklusivität	☐	☐	☐	☐	☐	☐
Sparsamkeit: Massvoller Umgang mit Geld und wirtschaftlichen Gütern	☐	☐	☐	☐	☐	☐

2. Wie schätzen Sie Ihr Wissen zum Thema Energie ein?

	sehr wenig					sehr viel
	1	*2*	*3*	*4*	*5*	*6*
Über Energie weiss ich...	☐	☐	☐	☐	☐	☐

2.1 Bitte lesen Sie jede der folgenden Behauptungen sorgfältig durch und geben Sie an, ob die Aussage Ihrer Meinung nach zutrifft oder nicht. Bei Unsicherheit haben Sie die Möglichkeit «weiss nicht» anzukreuzen.
Wenn im Folgenden von Energie im Allgemeinen die Rede ist, sind damit sowohl *elektrischer Strom* als auch *Brennstoffe (Heizstoffe und Kraftstoffe)* gemeint.

	trifft zu	trifft nicht zu	weiss nicht
Europa verfügt über wenige **Energie**quellen, deshalb ist es wichtig, auf den Energieverbrauch zu achten.	☐	☐	☐
Die Schweiz ist im Moment zu 80 % auf **Energie**importe angewiesen.	☐	☐	☐
Der überwiegende Anteil des in die Schweiz importierten Rohöls stammt aus afrikanischen Ländern.	☐	☐	☐
Beim Stromgewinnungsprozess in einem Kernkraftwerk wird CO_2 ausgestossen.	☐	☐	☐
In der Schweiz wird Strom fast ausschliesslich aus Kernkraft produziert.	☐	☐	☐
Der grösste Anteil der in der Schweiz konsumierten **Energie** stammt aus fossilen Energieträgern (z.B. Erdöl, Erdgas oder Kohle).	☐	☐	☐
Die **Energie**bilanz von Fleisch ist gegenüber pflanzlichen Nahrungsmitteln besser.	☐	☐	☐
Die Mobilität im Inland macht den grössten Anteil des schweizerischen **Energie**verbrauchs aus; an zweiter Stelle folgt das Heizen (Raumwärme).	☐	☐	☐
Im Haushalt verbraucht der Warmwasserbereich am meisten **Energie**; an zweiter Stelle folgt das Heizen (Raumwärme).	☐	☐	☐
Das «Abwaschen» mit einem Geschirrspüler kann energiesparsamer sein als die Handwäsche.	☐	☐	☐
Um im Winter im Haushalt für genügend frische Luft zu sorgen, ist es am energiesparsamsten, wenn ein Kippfenster für einige Zeit geöffnet wird.	☐	☐	☐
Um Wassermengen bis zu einem Liter zu erwärmen, ist der elektrische Wasserkocher die energiesparsamere Variante als die Herdplatte.	☐	☐	☐
Der CO_2-Ausstoss spielt eine wichtige Rolle im Zusammenhang mit der globalen Erwärmung.	☐	☐	☐

	< 10	10-30	31-50	51-70	71-90	> 90
2.2 Wie viel kostet eine Kilowattstunde (kWh) elektrische Energie im Hochtarif in Rappen?	☐	☐	☐	☐	☐	☐

	4-7 J.	8-11 J.	12-15 J.	16-19 J.	20-23 J.	24-27 J.
2.3 Wie viele Jahre beträgt die durchschnittliche Lebensdauer eines Gefrierschranks?	☐	☐	☐	☐	☐	☐

3. Bitte geben Sie an, wie oft Sie die unten aufgelisteten Verhaltensweisen ausführen. Einige Verhaltensweisen beziehen sich auf Haushaltsgeräte. Falls Sie über ein Gerät nicht verfügen oder aus anderen Gründen keine Angaben machen können, kreuzen Sie bitte «betrifft mich nicht» an.

	nie *1*	selten *2*	ab und zu *3*	oft *4*	fast immer *5*	immer *6*	betrifft mich nicht
Bad nehmen	☐	☐	☐	☐	☐	☐	☐
Waschmaschine möglichst gut füllen	☐	☐	☐	☐	☐	☐	☐
Vor der Abreise in die Ferien Heizung auf Reduzierbetrieb stellen oder abschalten	☐	☐	☐	☐	☐	☐	☐
Mit dem Zug in die Ferien reisen	☐	☐	☐	☐	☐	☐	☐
Lebensmittel aus der Region kaufen	☐	☐	☐	☐	☐	☐	☐
Die Gefriertruhe/den Gefrierschrank/das Gefrierfach abtauen	☐	☐	☐	☐	☐	☐	☐
Saisonales Obst und Gemüse kaufen	☐	☐	☐	☐	☐	☐	☐
Wäsche bei niedrigen Temperaturen waschen (z.B. Kochwäsche bei 60 °C, leicht verschmutzte Wäsche bei 30 °C)	☐	☐	☐	☐	☐	☐	☐
Stand-by bei Geräten ausschalten	☐	☐	☐	☐	☐	☐	☐
Leitungswasser trinken anstelle von Mineralwasser	☐	☐	☐	☐	☐	☐	☐
Im Winter nur kurz aber intensiv lüften	☐	☐	☐	☐	☐	☐	☐
Private Flugreisen über kurze Distanzen (d.h. in Nachbarländer) durch Nutzung alternativer Reisemöglichkeiten vermeiden	☐	☐	☐	☐	☐	☐	☐
Eingeflogene Lebensmittel meiden	☐	☐	☐	☐	☐	☐	☐
Wäsche mit Wäschetrockner trocknen	☐	☐	☐	☐	☐	☐	☐
Fahrgemeinschaften bilden, wenn eine Strecke mit dem Auto zurückgelegt wird	☐	☐	☐	☐	☐	☐	☐

	nie	selten	ab und zu	oft	fast immer	immer	betrifft mich nicht
	1	*2*	*3*	*4*	*5*	*6*	
Lebensmittel aus entfernten Ländern meiden	☐	☐	☐	☐	☐	☐	☐
Raumtemperatur den Nutzungsverhältnissen der einzelnen Räume anpassen, z.B. ungenutzte Räume auf Sparflamme	☐	☐	☐	☐	☐	☐	☐
Mit Deckel auf Pfanne kochen	☐	☐	☐	☐	☐	☐	☐

4. Stellen Sie sich vor, Sie möchten einen Gefrierschrank kaufen. Der Verkäufer erwähnt während des Gesprächs, dass die durchschnittliche Lebensdauer eines Gefrierschranks 15 Jahre beträgt. Der Verkäufer stellt Ihnen die zwei folgenden qualitativ gleichwertigen Modelle zur Auswahl:

Modell 1	
Nutzinhalt:	97 l
Kaufpreis:	CHF 850.-
Stromkosten über 15 Jahre:	ca. CHF 375.-
Kaufpreis & Stromkosten über 15 Jahre:	ca. CHF 1'225.-

Modell 2	
Nutzinhalt:	97 l
Kaufpreis:	CHF 640.-
Stromkosten über 15 Jahre:	ca. CHF 825.-
Kaufpreis & Stromkosten über 15 Jahre:	ca. CHF 1'465.-

Bitte geben Sie an, welches Modell Sie bevorzugen. Je mehr links Sie ankreuzen, desto stärker bevorzugen Sie Modell 1, und je mehr rechts Sie ankreuzen, desto stärker bevorzugen Sie Modell 2.

starke Bevorzugung von Modell 1			**keine Bevorzugung**			**starke Bevorzugung von Modell 2**
1	*2*	*3*	*4*	*5*	*6*	*7*
☐	☐	☐	☐	☐	☐	☐

5. Sind Sie in den letzten 12 Monaten Auto gefahren (d.h. Sie selbst sassen am Steuer)?

ja ☐ **nein** ☐ **→ Falls nein, bitte weiter zu Frage 6**

Falls ja, geben Sie bitte an, wie oft Sie folgende Verhaltensweisen ausführen:

	nie	selten	ab und zu	oft	fast immer	immer
	1	*2*	*3*	*4*	*5*	*6*
Für Distanzen bis zu 3 km das Fahrrad oder öffentliche Verkehrsmittel verwenden	☐	☐	☐	☐	☐	☐
Schon bei kurzer Wartezeit vor Rotlicht Motor abstellen	☐	☐	☐	☐	☐	☐
In höchstmöglichem Gang bei tiefer Drehzahl fahren	☐	☐	☐	☐	☐	☐
Auf Autobahn bewusst nicht mehr als 100 km/h fahren	☐	☐	☐	☐	☐	☐

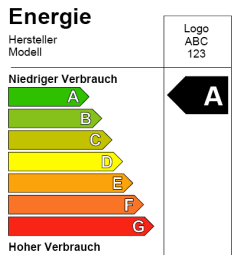
6. Bitte geben Sie an, inwiefern Sie die folgenden Energiesparmassnahmen ergreifen bzw. ergriffen haben.

	ja	nein
Ich achte beim Kauf von elektrischen Geräten bewusst auf deren Energieverbrauch.	☐	☐
Die Wasserhähne sind mit einem Durchflussbegrenzer ausgestattet.	☐	☐
Die Dusche ist mit einer Sparbrause ausgestattet.	☐	☐

7. Bitte geben Sie an, inwiefern die folgenden Aussagen auf Sie zutreffen. Falls sich eine Aussage auf ein Gerät bezieht, über das Sie nicht verfügen, oder Sie aus anderen Gründen keine Angabe machen können (z.B. Vegetarier), kreuzen Sie bitte «keine Angabe möglich» an.

	trifft gar nicht zu					trifft voll und ganz zu	keine Angabe möglich
	1	*2*	*3*	*4*	*5*	*6*	
Wenn ich einen Raum verlasse, lösche ich das Licht.	☐	☐	☐	☐	☐	☐	☐
In meinem Haushalt ist im Winter die Raumtemperatur im Wohnzimmer nicht höher als 20 °C eingestellt.	☐	☐	☐	☐	☐	☐	☐
Wenn ich ein Kleidungsstück (Pullover, Hose etc.) einen Tag lang getragen habe, wird es gewaschen, egal ob schmutzig oder nicht.	☐	☐	☐	☐	☐	☐	☐
In meinem Haushalt läuft der Fernseher fast ständig, auch wenn niemand davor sitzt.	☐	☐	☐	☐	☐	☐	☐
Ich nehme für kurze Strecken (bis zu 1 km) das Fahrrad oder gehe zu Fuss.	☐	☐	☐	☐	☐	☐	☐
Ich lasse beim Zähneputzen das Warmwasser durchgehend laufen.	☐	☐	☐	☐	☐	☐	☐
In meinem Haushalt wird die Einstellung der Temperaturregler an den einzelnen Heizungsradiatoren nicht verändert.	☐	☐	☐	☐	☐	☐	☐
Ich geniesse es, lange zu duschen.	☐	☐	☐	☐	☐	☐	☐
Es ist für mich üblich, dass die meisten meiner Mahlzeiten Fleisch beinhalten.	☐	☐	☐	☐	☐	☐	☐
Ich trage im Winter zu Hause gerne nur ein T-Shirt (ohne Pullover).	☐	☐	☐	☐	☐	☐	☐
In meinem Haushalt werden regelmässig Tiefkühlprodukte gekauft.	☐	☐	☐	☐	☐	☐	☐

8. Bitte beantworten Sie die folgenden Fragen zur energieEtikette bei Haushaltsgeräten (Kühl- und Gefriergeräte, Wäschetrockner etc.).



Kennen Sie die energieEtikette (siehe Abb.) von Haushaltsgeräten?

ja	nein
☐	☐

Falls ja, wie wichtig ist die energieEtikette für Ihre Kaufentscheidung?

gar nicht kaufentscheidend					sehr kaufentscheidend
1	2	3	4	5	6
☐	☐	☐	☐	☐	☐

9. Bitte stufen Sie ein, inwiefern die folgenden Aussagen auf Sie zutreffen.

	trifft gar nicht zu					trifft voll und ganz zu
	1	2	3	4	5	6
Ich achte im Haushalt primär aus Kostengründen auf den Energieverbrauch.	☐	☐	☐	☐	☐	☐
Ich achte im Haushalt primär aus allgemeinem Energiebewusstsein auf den Energieverbrauch.	☐	☐	☐	☐	☐	☐
Ich achte beim Kauf von Haushaltsgeräten aufgrund der Betriebskosten auf den Energieverbrauch.	☐	☐	☐	☐	☐	☐
Ich achte beim Kauf von Haushaltsgeräten aus allgemeinem Energiebewusstsein auf den Energieverbrauch.	☐	☐	☐	☐	☐	☐
Ich achte beim Kauf von Obst und Gemüse aus Energiebewusstsein auf Saisonalität und Herkunft.	☐	☐	☐	☐	☐	☐

10. Besitzen Sie ein Auto?

ja	nein	
☐	☐	→ **Falls nein, bitte weiter zu Frage 11**

10.1 Bitte geben Sie an, welche der folgenden Energiesparmassnahmen Sie in Bezug auf Ihr Auto ergreifen, wenn Sie sich ein neues Auto anschaffen, bzw. welche Sie bereits ergriffen haben.

	ja	nein
Beim Autokauf achte ich bewusst auf den Energieverbrauch des Fahrzeugs.	☐	☐
Beim Autokauf achte ich auf die Grösse und wähle eher ein kleines Modell.	☐	☐
Beim Autokauf achte ich auf einen umweltfreundlichen Antrieb (Erdgas etc.)	☐	☐

10.2 Wie sehr treffen die folgenden Aussagen im Zusammenhang mit dem Auto auf Sie zu?

	trifft gar nicht zu					trifft voll und ganz zu
	1	*2*	*3*	*4*	*5*	*6*
Ich nehme auch für kurze Distanzen (< 2 km) das Auto.	☐	☐	☐	☐	☐	☐
Ich versuche so oft wie möglich, öffentliche Verkehrsmittel oder das Fahrrad zu nutzen.	☐	☐	☐	☐	☐	☐
Ich fahre primär aus Sicherheitsgründen langsamer (d.h. max. 100 km/h) auf der Autobahn.	☐	☐	☐	☐	☐	☐
Ich kaufe aus Sicherheitsgründen ein grosses Auto.	☐	☐	☐	☐	☐	☐
Ich achte beim Autokauf aus Kostengründen auf einen geringen Energieverbrauch.	☐	☐	☐	☐	☐	☐
Ich achte beim Autokauf aus allgemeinem Energiebewusstsein auf den Energieverbrauch.	☐	☐	☐	☐	☐	☐

11. Nachfolgend sind einige Massnahmen zur Verbesserung der aktuellen Energiesituation aufgelistet. Bitte geben Sie an, wie akzeptabel die einzelnen Massnahmen für Sie sind.

	gar nicht akzeptabel					äusserst akzeptabel
	1	*2*	*3*	*4*	*5*	*6*
Alte Kernkraftwerke in der Schweiz erneuern/ ausgediente Kernkraftwerke durch neue ersetzen	☐	☐	☐	☐	☐	☐
Bau neuer Gaskraftwerke in der Schweiz	☐	☐	☐	☐	☐	☐
Anheben des Kaufpreises von Geräten mit hohem Energieverbrauch um 10 %	☐	☐	☐	☐	☐	☐
Einstellung des Verkaufs von Geräten mit einem hohen Energieverbrauch innerhalb einer Produktkategorie	☐	☐	☐	☐	☐	☐
Erhöhung der Preise für eingeflogenes Obst und Gemüse	☐	☐	☐	☐	☐	☐
Erhöhung der Treibstoffpreise um ca. 25 Rp./Liter	☐	☐	☐	☐	☐	☐
Lenkungsabgabe auf Treibstoffe von ca. 25 Rp./Liter – die Einnahmen fliessen über die Krankenkassen an die Bevölkerung zurück	☐	☐	☐	☐	☐	☐
Erhebung von Gebühren für die Benutzung der Strassen in der Innenstadt von grösseren Städten (Road Pricing)	☐	☐	☐	☐	☐	☐
Verteuerung verbrauchsintensiver Autos um max. CHF 3'000.- bei gleichzeitiger Vergünstigung verbrauchsarmer Autos um max. CHF 3'000.-	☐	☐	☐	☐	☐	☐

12. Wie wirksam sind die folgenden Massnahmen zur Verbesserung der Energiesituation in der Schweiz Ihrer Meinung nach?

Meiner Meinung nach, ist zur Verbesserung der Energiesituation in der Schweiz...

	gar nicht wirksam					äusserst wirksam
	1	*2*	*3*	*4*	*5*	*6*
...die Reduktion des Stromverbrauchs im Haushalt...	☐	☐	☐	☐	☐	☐
...die Reduktion der Auto-/Motorradnutzung...	☐	☐	☐	☐	☐	☐
...die Einschränkung des Konsums auf regionales und saisonales Obst und Gemüse...	☐	☐	☐	☐	☐	☐
...der Kauf von verbrauchsarmen Haushaltsgeräten...	☐	☐	☐	☐	☐	☐
...der Kauf von verbrauchsarmen Autos...	☐	☐	☐	☐	☐	☐

13. Als Nächstes möchten wir Ihre Einschätzung der persönlichen Handlungsmöglichkeiten in Bezug auf das Energiesparen erfragen. Bitte stufen Sie ein, wie stark die folgenden Aussagen auf Sie zutreffen.

	trifft gar nicht zu					trifft voll und ganz zu
	1	*2*	*3*	*4*	*5*	*6*
Ich kenne in meinem Haushalt die Bereiche mit dem grössten Energiesparpotential und könnte/konnte meinen Verbrauch entsprechend problemlos optimieren.	☐	☐	☐	☐	☐	☐
Ich verfüge über ausreichende Kenntnis der unterschiedlichen Fortbewegungsmöglichkeiten, um meine Fortbewegung energiebewusst zu gestalten.	☐	☐	☐	☐	☐	☐
Ich traue mir zu, beim Kauf von Obst und Gemüse eine energiebewusste Produktauswahl zu treffen.	☐	☐	☐	☐	☐	☐
Ich traue mir zu, mich beim Haushaltsgeräte- oder Autokauf energiebewusst zu entscheiden.	☐	☐	☐	☐	☐	☐
Ich denke, dass ich aufgrund meiner Fähigkeiten alle mit Energie verbundenen Probleme, mit denen ich konfrontiert werde, meistern kann.	☐	☐	☐	☐	☐	☐
Meine Anstrengungen, wenig Energie zu verbrauchen, sind nur Tropfen auf den heissen Stein und können nichts bewirken.	☐	☐	☐	☐	☐	☐
Auch meine vielen kleinen Bemühungen, Energie zu sparen, summieren sich und können in Bezug auf den allgemeinen Energieverbrauch etwas bewegen.	☐	☐	☐	☐	☐	☐

14. Nachfolgend sind einige Behauptungen bezüglich Auswirkungen des hohen Energiekonsums aufgeführt. Bitte geben Sie Ihre Zustimmung mit den unten aufgelisteten Aussagen an.

	stimme gar nicht zu					stimme voll und ganz zu
	1	*2*	*3*	*4*	*5*	*6*
Die steigende Nachfrage nach Energie ist ein ernsthaftes Problem für unsere Gesellschaft.	☐	☐	☐	☐	☐	☐
Die globale Erwärmung ist ein ernsthaftes Problem für unsere Gesellschaft.	☐	☐	☐	☐	☐	☐
Die zunehmende Verknappung von Energiequellen ist ein ernsthaftes Problem für unsere Gesellschaft.	☐	☐	☐	☐	☐	☐
Die Behauptung, dass die Klimaänderung mit dem hohen Energiekonsum zusammenhängt, ist übertrieben.	☐	☐	☐	☐	☐	☐
Es wäre gravierend, wenn die Versorgung mit Energie nicht mehr sichergestellt wäre.	☐	☐	☐	☐	☐	☐
Die Folgen der globalen Erwärmung (z.B. stärkere und häufigere Wetterextreme) sind schwerwiegend.	☐	☐	☐	☐	☐	☐
Die wirtschaftlichen und sozialen Folgen einer Energieknappheit (z.B. durch extrem angestiegene Energiepreise) sind gravierend.	☐	☐	☐	☐	☐	☐
Der hohe Energiekonsum hat **keine** Folgen für die Gesundheit.	☐	☐	☐	☐	☐	☐

15. Bitte geben Sie an, wie wahrscheinlich die folgenden Szenarien Ihrer Meinung nach sind, wenn der Energieverbrauch nicht genügend gesenkt wird.

Wenn der Energiekonsum nicht entsprechend gesenkt wird,...

	extrem unwahr-scheinlich					extrem wahr-scheinlich
	1	*2*	*3*	*4*	*5*	*6*
...kann aufgrund der zu hohen Nachfrage mein Energiebedarf nicht mehr gedeckt werden.	☐	☐	☐	☐	☐	☐
...werden sich die gravierenden Folgen der globalen Erwärmung (z.B. stärkere und häufigere Wetterextreme) negativ auf mein Leben auswirken.	☐	☐	☐	☐	☐	☐
...bekomme ich die wirtschaftlichen und sozialen Folgen der Energieknappheit negativ zu spüren, z.B. durch extrem hohe Energiepreise.	☐	☐	☐	☐	☐	☐
...wird meine Gesundheit Schaden nehmen.	☐	☐	☐	☐	☐	☐

16. Inwiefern treffen die folgenden Aussagen auf Sie zu?

	trifft gar nicht zu					trifft voll und ganz zu
	1	*2*	*3*	*4*	*5*	*6*
Ich fühle mich für die Verknappung fossiler Energieträger (Erdöl, Erdgas etc.) mitverantwortlich.	☐	☐	☐	☐	☐	☐
Ich fühle mich für die globale Erwärmung mitverantwortlich.	☐	☐	☐	☐	☐	☐
Ich fühle mich für die Verknappung der Energiequellen mitverantwortlich.	☐	☐	☐	☐	☐	☐
Mein Mitwirken an der Entstehung der Energie-problematik ist unerheblich und vernachlässigbar.	☐	☐	☐	☐	☐	☐
Ich fühle mich persönlich dazu verpflichtet, wo es nur geht, unnötigen Energieverbrauch zu vermeiden.	☐	☐	☐	☐	☐	☐
Ich fühle mich schuldig, wenn ich für eine Strecke ein verbrauchsintensives Fortbewegungsmittel wähle, obwohl es eine energiefreundlichere Reisevariante gäbe.	☐	☐	☐	☐	☐	☐
Ich habe ein schlechtes Gewissen, wenn im Haushalt unnötig Energie verbraucht wird (z.B. Licht brennen lassen in unbenutzten Räumen).	☐	☐	☐	☐	☐	☐
Ich habe ein schlechtes Gewissen, wenn ich im Winter z.B. Erdbeeren aus Südafrika kaufe und nicht ein saisonales Produkt aus der Region.	☐	☐	☐	☐	☐	☐

17. Im Folgenden sind einige allgemeine Aussagen im Zusammenhang mit Energieverbrauch bzw. Energiesparen aufgelistet. Bitte geben Sie an, inwiefern die Aussagen auf Sie zutreffen.

	trifft gar nicht zu					trifft voll und ganz zu
	1	*2*	*3*	*4*	*5*	*6*
Energiesparen ist mir wichtig.	☐	☐	☐	☐	☐	☐
Ich beabsichtige, meinen Energieverbrauch zu reduzieren bzw. weiter zu reduzieren.	☐	☐	☐	☐	☐	☐
Energiesparen ist für mich selbstverständlich, da ich entsprechend erzogen wurde.	☐	☐	☐	☐	☐	☐
Ich achte auf den Energieverbrauch, weil mir die Zukunft der nächsten Generation am Herzen liegt.	☐	☐	☐	☐	☐	☐
Ich möchte das Leben geniessen und mir keine Gedanken über den Energieverbrauch machen.	☐	☐	☐	☐	☐	☐

	trifft gar nicht zu					trifft voll und ganz zu
	1	*2*	*3*	*4*	*5*	*6*
Energiesparverhalten im Mobilitätsbereich ist für mich mit zu hohen Komforteinbussen verbunden.	☐	☐	☐	☐	☐	☐
Energiesparverhalten im Haushaltsbereich ist für mich mit zu hohen Komforteinbussen verbunden.	☐	☐	☐	☐	☐	☐
Energiesparverhalten im Lebensmittelbereich ist für mich mit zu hohen Komforteinbussen verbunden.	☐	☐	☐	☐	☐	☐
Energieeffiziente Investitionen sind für mich mit einem zu hohen finanziellen Aufwand verbunden.	☐	☐	☐	☐	☐	☐
Ich habe das Gefühl, dass man heutzutage aufgrund der gesellschaftlichen Erwartungen schon fast gezwungen ist, Energie zu sparen.	☐	☐	☐	☐	☐	☐
Ich finde es wichtiger, an erster Stelle auf den CO_2-Ausstoss zu achten, als zu versuchen, in allen möglichen Bereichen Energie zu sparen.	☐	☐	☐	☐	☐	☐
Energiesparen muss für mich mit finanziellen Anreizen verknüpft sein.	☐	☐	☐	☐	☐	☐
Wenn ich meinen Energieverbrauch reduziere, dann verbrauchen andere zu günstigeren Bedingungen umso mehr Energie.	☐	☐	☐	☐	☐	☐
Ich vertraue dem Staat, dass er effiziente Massnahmen zur Reduktion des Energieverbrauchs trifft.	☐	☐	☐	☐	☐	☐
Ich finde, dass der Staat in einigen Bereichen (z.B. Glühlampenverbot) zu sehr in die Entscheidungsfreiheit der Bevölkerung eingreift.	☐	☐	☐	☐	☐	☐

18. Bitte lesen Sie die folgenden Instruktionen genau durch und treffen Sie bei den anschliessenden Wahlaufgaben Ihre Auswahl.

Stellen Sie sich vor, dass Sie zufällig mit einer anderen Person gepaart wurden. Sie kennen diese andere Person nicht und Sie werden ihr in Zukunft auch nie begegnen.
Beide, Sie und die andere Person, werden im Folgenden jeweils zwischen drei Varianten eine Auswahl treffen. Ihre Wahl bringt beiden, also Ihnen selbst und der anderen Person, Punkte ein. Gleichermassen wird die Wahl der anderen Person ihr selbst und Ihnen Punkte einbringen.
Jeder Punkt ist von grossem Wert: Je mehr Punkte Sie erhalten, desto besser für Sie, und je mehr Punkte die andere Person erhält, desto besser für die andere Person.

Hier ein Beispiel:

	A	B	C
Sie erhalten	500	500	550
Die andere Person erhält	100	500	300

Würde Ihre Wahl in diesem Beispiel zugunsten A ausfallen, würden Sie 500 Punkte und die andere Person 100 Punkte erhalten; bei einer Wahl der Variante B, würden Sie 500 Punkte und die andere Person 500 Punkte erhalten; und bei einer Entscheidung zugunsten C, würden Sie 550 Punkte und die andere Person 300 Punkte erhalten.
Wie Sie dem Beispiel entnehmen können, beeinflusst Ihre Wahl sowohl Ihren eigenen Punktegewinn wie auch den Punktegewinn der anderen Person.

Bevor Sie mit den eigentlichen Auswahlaufgaben beginnen, möchten wir Sie darauf aufmerksam machen, dass es keine richtigen oder falschen Entscheidungen gibt. Wählen Sie einfach diejenige Variante aus, die Sie bevorzugen.

Bitte setzen Sie für jede der neun nachfolgenden Auswahlsituationen ein Kreuzchen in das Kästchen **über** derjenigen Variante, die Sie am meisten bevorzugen:

		☐	☐	☐
1)	Sie erhalten	480	540	480
	Die andere Person erhält	80	280	480
		☐	☐	☐
2)	Sie erhalten	560	500	500
	Die andere Person erhält	300	500	100
		☐	☐	☐
3)	Sie erhalten	520	520	580
	Die andere Person erhält	520	120	320
		☐	☐	☐
4)	Sie erhalten	500	560	490
	Die andere Person erhält	100	300	490
		☐	☐	☐
5)	Sie erhalten	560	500	490
	Die andere Person erhält	300	500	90

		☐	☐	☐
6)	Sie erhalten	500	500	570
	Die andere Person erhält	500	100	300
		☐	☐	☐
7)	Sie erhalten	510	560	510
	Die andere Person erhält	510	300	110
		☐	☐	☐
8)	Sie erhalten	550	500	500
	Die andere Person erhält	300	100	500
		☐	☐	☐
9)	Sie erhalten	480	490	540
	Die andere Person erhält	100	490	300

19. Bitte beantworten Sie die folgenden Fragen zu Ihrer Person.

	überhaupt nicht gut					extrem gut
	1	*2*	*3*	*4*	*5*	*6*
Wie gut sind Sie im Lösen von Bruchrechnungen?	☐	☐	☐	☐	☐	☐
Wie gut sind Sie im Lösen von Prozentrechnungen?	☐	☐	☐	☐	☐	☐
Wie gut können Sie 15 % Trinkgeld berechnen?	☐	☐	☐	☐	☐	☐
Wie gut können Sie berechnen, wie viel ein T-Shirt kostet, wenn es 25 % billiger ist?	☐	☐	☐	☐	☐	☐

Wie hilfreich finden Sie Tabellen und Grafiken in einem Zeitungsartikel?

überhaupt nicht hilfreich					sehr hilfreich
1	*2*	*3*	*4*	*5*	*6*
☐	☐	☐	☐	☐	☐

Wenn Ihnen Leute über die Wahrscheinlichkeit berichten, mit der etwas geschehen wird, bevorzugen Sie Worte (z.B. es geschieht selten) oder Zahlen (z.B. es geschieht mit einer Wahrscheinlichkeit von 1 %)?

Ich bevorzuge immer Worte.					Ich bevorzuge immer Zahlen.
1	*2*	*3*	*4*	*5*	*6*
☐	☐	☐	☐	☐	☐

Wenn Sie einen Wetterbericht hören, bevorzugen Sie Wettervorhersagen in Prozentwerten (Die Wahrscheinlichkeit ist 20 %, dass es heute regnet) oder in Worten (Die Wahrscheinlichkeit ist klein, dass es heute regnet)?

Ich bevorzuge immer Worte.					Ich bevorzuge immer Zahlen.
1	*2*	*3*	*4*	*5*	*6*
☐	☐	☐	☐	☐	☐

Wie häufig finden Sie es nützlich, Informationen im Zahlenformat zu erhalten?

nie					sehr häufig
1	*2*	*3*	*4*	*5*	*6*
☐	☐	☐	☐	☐	☐

20. Zum Schluss möchten wir Sie noch um einige Angaben zu Ihrer Person und zu Ihrer Haushaltsstruktur bitten.

Bitte geben Sie Ihr Geschlecht an.

weiblich	männlich
☐	☐

Bitte geben Sie Ihren Jahrgang an.

1	9		

Welchen höchsten allgemein bildenden Schulabschluss haben Sie?

Primarschule	Real-/ Sekundar-/ Bezirksschule	Berufs-/ Gewerbe-/ KV-Schule	Mittel-/ Handelsschule/ Gymnasium	Höhere Fach-/ Berufs-ausbildung	Hoch-/ Fachhoch-schule	Universität/ ETH
☐	☐	☐	☐	☐	☐	☐

In welchem Bereich liegt Ihr monatliches Haushaltseinkommen (netto), d.h. das Einkommen aller Mitglieder Ihres Haushalts zusammen?

weniger als CHF 3'000.-	CHF 3'000.- bis CHF 5'000.-	CHF 5'001.- bis CHF 10'000.-	über CHF 10'000.-
☐	☐	☐	☐

Wo wohnen Sie?

Stadt	Agglomeration städtische Umgebung	Land
☐	☐	☐

Bewohnen Sie...?

ein Einfamilienhaus	eine Doppel-haushälfte	eine Wohnung	anderes
☐	☐	☐	☐

Sind Sie...?

Eigentümer	Mieter
☐	☐

Wie viele Personen ab 18 Jahren leben nebst Ihnen in Ihrem Haushalt?

Ich wohne alleine.	1 weitere Person	2 weitere Personen	3 weitere Personen	4 und mehr Personen
☐	☐	☐	☐	☐

Wie viele Personen unter 18 Jahren leben in Ihrem Haushalt?

keine	1 Kind/ Jugendlicher	2 Kinder/ Jugendliche	3 Kinder/ Jugendliche	> 3 Kinder/ Jugendliche
☐	☐	☐	☐	☐

Über wie viele Autos verfügen Sie in Ihrem Haushalt?

keines	1	2	3	mehr als 3
☐	☐	☐	☐	☐

Wie viele Kilometer legen Sie persönlich (am Steuer oder als BeifahrerIn) durchschnittlich im Jahr für private Zwecke (inkl. Arbeitsweg) mit Ihrem privaten Auto und/oder Motorrad zurück?

Ich fahre nie.	weniger als 5'000 km	5'000 km – 10'000 km	10'001 km – 15'000 km	15'001 km – 20 '000 km	20'001 km – 25'000 km	25'001 km – 30'000 km	mehr als 30'000 km
☐	☐	☐	☐	☐	☐	☐	☐

Wie viele Kilometer legen Sie persönlich durchschnittlich im Monat für private Zwecke (inkl. Arbeitsweg) mit öffentlichen Verkehrsmitteln zurück? (Strecke Bern – Zürich beträgt ca. 120 km)

Ich fahre nie ÖV.	weniger als 200 km	200 km – 500 km	501 km – 1'000 km	1'001 km – 1'500 km	1'501 km – 2'000 km	2'001 km – 2'500 km	mehr als 2'500 km
☐	☐	☐	☐	☐	☐	☐	☐

Wie oft nutzen Sie die folgenden Medien?

	nie	**ab und zu**	**regelmässig**
Gratiszeitungen (z.B. 20 Minuten)	☐	☐	☐
Blick	☐	☐	☐
Neue Zürcher Zeitung (NZZ)	☐	☐	☐
Regionale Zeitungen (Berner Zeitung, Basler Zeitung etc.)	☐	☐	☐
Am Sonntag erscheinende Zeitungen (Sonntagsblick etc.)	☐	☐	☐
Schweizer Fernsehen SF	☐	☐	☐
Private/regionale Schweizer Fernsehsender (3+, TeleBasel etc.)	☐	☐	☐
Ausländische Fernsehsender	☐	☐	☐
Schweizer Radio DRS	☐	☐	☐
Schweizer Privatradios (z.B. Radio Argovia)	☐	☐	☐
Auslandradios	☐	☐	☐

Herzlichen Dank für Ihre Teilnahme!

3

Appendix B

Results of Principal Component Analyses

Table B1. **Factor Loadings of Energy-Saving Curtailment Behaviors Related to Car After Varimax Rotation**

Items	Factor	
	1	2
Use public transportation or bicycle for distances up to 3 km	0.87	
Take the car even for short distances (< 2 km) (recoded)	0.81	
Use public transportation or the bicycle if possible	0.85	
Turn off the engine even for a short wait at red light		0.72
Use highest gear possible and drive with low engine RPM		0.74
Consciously drive no faster than 100 km/h on the highway		0.54
Eigenvalues	2.17	1.39
Explained variance	36.22	23.12

Note. Only factor loadings higher than 0.50 are presented. Factor interpretations are as follows: 1 = Energy-saving car use behavior: Alternatives to car; 2 = Energy-saving car use behavior: Energy-saving driving.

Table B2. **Factor Loadings of Acceptance of Policy Measures After Varimax Rotation**

Items	Factor		
	1	2	3
Renew old nuclear power plants/replace old nuclear power plants by new ones in Switzerland	0.97		
Increase in purchase price of appliances with high energy consumption by 10%		0.77	
Cessation of sale of appliances with high energy consumption within a product category		0.82	
Increase in purchase price of fruits and vegetables flown in		0.72	
Increase in purchase price of cars with high energy consumption by max. CHF 3,000 while at the same time reducing purchase price of cars with low energy consumption by max. CHF 3,000		0.56	
Increase in fuel price by about 25 centimes/liter			0.77
Incentive tax of about 25 centimes/liter on fuels – revenues are redistributed to the population through health insurance funds			0.81
Charge for use of the roads in the town center of larger towns (Road pricing)			0.77
Eigenvalues	1.01	2.25	2.25
Explained variance	12.66	28.12	28.07

Note. Only factor loadings higher than 0.50 are presented. Factor interpretations are as follows: 1 = Nuclear power plants; 2 = Sales regulations; 3 = Use regulations in mobility.

Table B3. **Factor Loadings of General Attitudes Related to Energy-Saving Behaviors After Varimax Rotation**

Items	Factor	
	1	2
Energy conservation is important to me.	0.86	
I intend to reduce/to further reduce my energy consumption.	0.79	
Energy conservation goes without saying since I was brought up accordingly.	0.80	
I pay attention to energy consumption because I care for the future of the next generation.	0.82	
To me, energy conservation behavior in the mobility domain entails losses of convenience that are too high.		0.77
To me, energy conservation behavior in the housing domain entails losses of comfort that are too high.		0.88
To me, energy conservation behavior in the food domain entails losses of welfare that are too high.		0.83
Eigenvalues	2.72	2.14
Explained variance	38.84	30.54

Note. Only factor loadings higher than 0.70 are presented. Factor interpretations are as follows: 1 = Basic convictions; 2 = Loss of comfort.

Appendix C

Descriptions and Consumption Scenarios Utilized in Study 1

Commuting scenario

Introductory text:

Both descriptions presented: In the following you are presented with two employees. Both live distant from their place of work and, accordingly, have to cover a certain distance to work:

One description presented: In the following you are presented with an employee. He lives distant from his place of work and, accordingly, has to cover a certain distance to work:

Positive symbolic significant behavior: Train commuter

Mr. Müller lives 100 km from his place of work. He commutes every day by express train to work.

How energy conscious do you consider Mr. Müller?

Negative symbolic significant behavior: Car commuter

Mr. Egger lives 3 km from his place of work. He commutes every day with his car, a VW Golf label D with a 1.6 l engine, to work.

How energy conscious do you consider Mr. Egger?

Car-driving scenario

Introductory text:

Both descriptions presented: In the following you are presented with two car drivers. Both have recently purchased a new car:

One description presented: In the following you are presented with a car driver. He has recently purchased a new car:

Positive symbolic significant behavior: Prius driver

Mr. Meier drives a Toyota Prius with energy label A with hybrid drive (see picture). Mr. Meier covers a distance of 28,700 km with his car per year.

How energy conscious do you consider Mr. Meier?

Negative symbolic significant behavior: SUV driver

Mr. Huber drives an SUV (sport utility vehicle) with energy label C (see picture). Mr. Huber covers a distance of 11,400 km with his car per year.

How energy conscious do you consider Mr. Huber?

Room heating scenario

Introductory text:

Both descriptions presented: In the following you are presented with two house owners. Both own a single-family house in which they live alone:

One description presented: In the following you are presented with a house owner. She owns a single-family house in which she lives alone:

Positive symbolic significant behavior: Temperature 18 °C

Ms. Suter owns a single-family house with a living area of 205 m^2 (excl. attic and basement). Ms. Suter has set the room temperature to 18 °C in each room.

How energy conscious do you consider Ms. Suter?

Negative symbolic significant behavior: Temperature 22 °C

Ms. Nägeli owns a single-family house with a living area of 120 m^2 (excl. attic and basement). Ms. Nägeli has set the room temperature to 22 °C in each room.

How energy conscious do you consider Ms. Nägeli?

Meat consumption scenario

Introductory text:

Both descriptions presented: In the following you are presented with two persons. Both are single and cook for themselves. Occasionally, their meals include meat:

One description presented: In the following you are presented with a person. She is single and cooks for herself. Occasionally, her meals include meat:

Positive symbolic significant behavior: Frequency 2x a week

Ms. Rohner cooks 2 meals a week with Swiss beef.

How environmentally conscious do you consider Ms. Rohner?

Negative symbolic significant behavior: Frequency 4x a week

Ms. Widmer cooks 4 meals a week with Swiss chicken.

How environmentally conscious do you consider Ms. Widmer?

Appendix D

Overview of the Conducted Studies on the Symbolic Significance Heuristic

Table D1. **Overview of the Studies on the Symbolic Significance Heuristic, Including Study Aim, Recruitment Information, Question Wording and Results**

Study	Study aim	Recruitment	Time period	Sample size (*N*)	Question wording	Results	
						Condition	Effect size & Significance
Study 1	First evidence for the symbolic significance heuristic Generalization to different energy consumption domains	CB online panel[1]	Feb. 18 – Mar. 3, 2011	246	"How energy conscious do you consider XY?"	Between; commuting	*d* = 1.98***
						Between; car driving	*d* = 2.25***
						Between; heating	*d* = 1.54***
						Between; meat[2]	*d* = 0.30*
						Within; commuting	*d* = 1.73***
						Within; car driving	*d* = 1.79***
						Within; heating	*d* = 1.41***
						Within; meat	*d* = 0.58***
Study 2	Elimination of alternative explanation concerning automatic generalization to other behaviors	Student mailing list	Apr. 4 – Apr. 15, 2011	121	"How energy conscious do you consider XY with regard to his mobility behavior related to commuting to work / the car?"	Between; commuting	*d* = 3.05***
						Within; car driving	*d* = 1.69***
Study 3	Stability Test: Provision of detailed information on vehicle's fuel consumption	CB online panel[1]	Apr. 21 – May 11, 2011	243	"How energy conscious do you consider XY with regard to his mobility behavior related to commuting to work / the car?"	Commuting, no info	*d* = 1.93***
						Commuting, info	*d* = 2.10***
						Car driving, no info	*d* = 0.92***
						Car driving, info	*d* = 0.63**
Study 4	Stability test: Directly asking to judge energy consumption while providing all information necessary to calculate consumption	LINK online panel[3]	Jul. 22 – Aug. 2, 2011	984	"How do you judge the energy consumption of Mr. XY with regard to the mobility behavior described above?"	Between; commuting	*d* = 1.37***
						Within; commuting	*d* = 1.20***
						Between; car driving	*d* = 0.86***
						Within; car driving	*d* = 1.11***
Study 5	Evidence for differing symbolic significance: Systematic manipulation of symbolic significance	LINK online panel[3]	Oct. 14 – Oct. 24, 2011	507	"How do you judge the energy consumption of Mr. XY with regard to the mobility behavior described above?"	High symbolic significance	*d* = 1.28***
						Low symbolic significance	*d* = 0.32**
						No symbolic significance	*d* = 0.47***

Note. Effect Sizes and significances of the differences in judgments of energy consumers described with symbolic positive vs. symbolic negative behaviors are presented; * $p < .05$; ** $p < .01$; *** $p < .001$; [1] Internet Panel of the Consumer Behavior Group, ETH Zurich; [2] one-tailed; [3] Internet Panel of the of Swiss market research institution LINK.