



Consumer behavior and climate change: consumers need considerable assistance

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The mounting research on consumer behavior and climate change is gradually improving our understanding of effective ways to mobilize consumers to mitigate climate change. The relationship between consumer behavior and climate change is complex and most consumers are not capable of determining which behavior changes are worth doing. Research has come a long way identifying the most impactful behavior changes, but more research is needed to refine and situate these insights. The most important implication of the reviewed research is that most focus should be on making climate friendly behavior the easy behavior, in terms of securing a correct reflection of carbon footprint in prices, climate friendly products that compare favorably to unfriendly alternatives, and carbon labeling.

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Introduction

The unprecedented global growth in production and consumption over the last 200 years, made possible by major break-throughs in science and technology, has led to substantial improvements in the lives of billions of people in terms of both life expectancy and life satisfaction. At the same time, human activity has now become so dominant on the planet that scientists speak about a new geological epoch — the ‘Anthropocene’ — and it appears that human activity has already led to or is on the verge of crossing critical planetary boundaries, which can lead to disastrous consequences for humanity and other species on the planet [1]. One of the most fundamental of these planetary boundaries is a stable global temperature, which is threatened by emissions of CO₂ and other climate gasses from human production and consumption activities. To mitigate

an increase in global temperature of more than 1.5°C above pre-industrial levels [2], governments around the world have made commitments to dramatically reduce emissions of climate gasses during the next couple of decades, following the Paris Climate Agreement.¹ However, to reach this goal, governments need to mobilize the civil society, including both private companies and consumers, to change production and consumption patterns in a more climate friendly direction.

It has been estimated that through the realistic implementation of already known changes in consumer behavior, the European Union (EU) could reduce its carbon footprint by about 25% [3**]. The most impactful are changes in the consumption pattern (28% of the total), reduced consumption (26%), switching to goods with a lower carbon footprint in production (17%) and to goods with less carbon emission during use (19%). By sector, it is still transport (39%), buildings (24%) and food (26%) that account for the highest shares of the carbon footprint of consumption. Moran *et al.* [3**] estimated the effects of 90 demand-side behavior change opportunities identified by prior research, and found that 65 of these contribute negligibly to carbon footprint at the national level. Hence, it is important to focus efforts on the behavior changes with the biggest potential impact [4]. The individual carbon footprint increases with income, especially in the transport category where high-carbon behavior categories, such as air travel and car use, have a high income elasticity [5]. Hence, to reduce climate impacts, it makes sense to focus especially on changing the behavior of consumers from the highest income levels [6*].

Essentially, consumers can reduce their carbon footprint by reducing consumption that is particularly taxing on the climate, such as air traveling [3**] and eating meat from ruminants [7]. Most often, reducing consumption means replacing it with something else, hopefully less carbon intensive, like taking the train [8] or eating a more plant-based diet [9]. Consumers can also choose more climate friendly options when buying products, such as the most energy efficient appliances or electric vehicles [10].

In this short paper, I review recent research on consumer behavior and climate change, focusing particularly on two

¹ <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>.

questions: (1) What are the most important drivers and impediments of climate (un)friendly consumer behavior? (2) What are the most effective, efficient and acceptable interventions to change consumption patterns in a more climate friendly direction? Research on these questions has increased a lot in recent decades. However, we still need a better understanding of demand-side solutions to climate change [11]. I take my point of departure in a systematic search for peer-reviewed empirical research on these questions, published after 2018.

Method

For the present purpose, the systematic literature search was done in Scopus, which is one of the few academic databases available that was assessed suitable for systematic reviews by a recent systematic assessment [12]. I searched for peer-reviewed academic literature published after 2018 and included the expressions 'climate change' and 'consumer behavior' in the title, abstract or keywords. Specifically, I used the search string: TITLE-ABS-KEY ('climate change' AND consumer AND behavior*) PUBYEAR > 2018. The literature search was carried out in the last week of December 2020 and it identified 217 entries in the Scopus database. These entries were then screened for relevance, first just looking at the title and publication type, next also reading the abstracts, and finally reading in full the papers that passed through the first two screenings. Supplementary searches were carried out in a few cases where recent research on important topics seemed to be missing, resulting in six additional publications.

The screening based on titles and publication types identified 99 entries that were deemed outside the scope of this review (17 conference papers, six editorials, letters and similar, six review articles and 76 others that used the search terms in another meaning than in this review, for example, focusing on non-human ecosystems). The screening based on the abstracts identified 41 additional entries that used the search terms in a different meaning than in this review (for example, studies in macroeconomics, system dynamics or IT). Finally, the reading of the full texts of the remaining articles led to the identification of 22 articles that studied attitudes or behaviors that after closer scrutiny had no or marginal climate relevance (like, the choice between organic and non-organic beef or eco-labelled green tea). Of the 47 publications in the final sample, one is a book chapter and 46 are empirical journal articles.

Of the 46 empirical journal articles, five were published in *Sustainability*, five in *Journal of Cleaner Production*, four in *Appetite*, three in *Resources, Conservation & Recycling*, and the rest were spread over 24 journals publishing one or two of the sampled articles each. Of the 47 publications reporting primary data, 36 reported data from economically developed countries (22 from Europe, seven from North America, four from Oceania, three from Asia and two from

South America). Four studies were carried out in China, two in Malaysia, and one each in India, Vietnam, Pakistan, and Sri Lanka. Hence, there is a strong bias towards developed, Western economies in this research. A few papers focused on climate friendly behavior or choices in general, but the vast majority focused on climate friendly behavior in a specific sector. Of the latter, 21 focused on food choices (primarily meat versus vegetables or alternative protein sources, such as insects), 13 on energy-related choices (appliances, light, solar panels), nine on travel-related choices (flying, buying an electric vehicle), and one on fashion. Hence, the single-sector studies to a high extent focus on the sectors that account for the highest share of the carbon footprint of consumption.

Results

Table 1 reports an analysis of the 47 empirical articles sorted according to key focus areas. The table also summarizes identified drivers and impediments and proposed interventions as well as the best estimates from research on the climate change mitigation potential of behavior change in each of the key focus areas.

Lifestyle changes

A stream of research has investigated the motivation driving and the impact of lifestyle changes, such as anti-consumption [13], voluntary simplicity [14], and down-shifting [15]. Peifer *et al.* [16] find that voluntary simplicity is positively related to perceived consequences for others and that making the link between consumption and climate change salient significantly reduces intentions to buy a new pair of shoes that is desired, but not needed. Others found a positive effect on the willingness to change behavior for the climate only when making the link between our collective action and climate change salient, but not when making salient how one's own behavior harms the climate [17]. When it is voluntary, simplifying seems to have a positive impact on personal well-being [18] and satisfaction with choices [19]. Unfortunately, some of the climate benefits of simplifying are neutralized by rebound effects [20*].

Actions that have been suggested to reduce the carbon footprint of consumption vary widely in how effective they are [3**,21*]. However, assessing the carbon footprint of different behavior options is far too complicated for most consumers [22*,23,24,25]. This calls for better education to increase carbon numeracy, but even more for making the task easier, for example by means of carbon labeling or a uniform carbon tax [22*]. Domain-specific guidelines (e.g. for climate friendly food choices) can be effective as well, but perhaps only when differences between options are clear and unambiguous [26]. The short-term effect of price instruments is hampered by a lack of consumer sensitivity to smaller price differences and therefore a tax based on the carbon prices proposed

Table 1

Empirical studies on consumer behavior and climate change published after 2018 ordered according to key focus

	Lifestyle changes	Reduction, necessities	Reduction, luxuries	Reduction, waste	Substitution	Adoption
Key focus	Acquisitions	Electricity, heating	Flying	Food waste	Meat	Appliances, light, electric vehicles, energy systems
Drivers	Social norms, moral norms	Incentives, social norms, moral norms	Social norms, moral norms	Incentives, social norms, moral norms	Price, income (neg.)	Value compatibility, relative advantage, ease
Impediments	Complexity, goal conflicts	Situational constraints, habits, goal conflicts	Goal conflicts, available alternatives, (cheap) price	Goal conflicts, habits, complexity, situational constraints, income	Habits, complexity	Complexity, price, income
Interventions	Shorter working time, pricing, education, information, carbon labeling, framing	Support investments, habit discontinuity, pricing, information	Pricing/taxing	Behaviorally informed interventions, package size, guidelines, information, pricing	Tasty products and recipes, pricing, behaviorally informed interventions, trial and availability, social influence, carbon labeling, information	Pricing, facilitating context, information, labeling, standards, social influence
Climate effect (based on Ref. [21*])	+	++	+++	+	++	+++
Sources	[16–19,20*,22*]	[30–32]	[33,34]	[29,35*,36–41,42*]	[23–27,28**,43–52]	[53–66]

by the IPCC has been found to have a negligible effect on choices of everyday (e.g. dairy) products [27]. As documented by cross-country studies, in the longer term there is a clear negative relationship between the price and meat consumption, and a clear positive relationship between income and meat consumption [28**]. However, to speed up and amplify effects there is a need to supplement economic instruments by various behaviorally informed interventions [29].

With a few exceptions, empirical research on climate (un)friendly consumer behavior focuses on specific carbon-intensive behaviors, mostly investigating consumers' willingness to change to a less carbon intensive substitute (such as a diet with less meat), but sometimes just cutting down on a carbon intensive behavior that is viewed as a luxury (such as vacation air traveling) or waste. Another big category of studies investigates consumer willingness to adopt products with less carbon emission during use, such as electric vehicles (EVs) or energy efficient appliances.

Reduction

Electricity and heating are necessary, but they are derived demand and the most important barriers to reduction are therefore situational constraints and habits rather than motivational factors [30]. More than two thirds of a random sample of UK homeowners being surveyed on heating-related goals mentioned 'avoiding wasting energy', but the study also revealed a complex web of needs related to heating, making it difficult to reduce [31].

Households usually have an economic incentive to save heating and electricity, and utilities sometimes provide additional incentives. A Swizz study found that electricity consumers generally prefer positive incentives for reducing consumption to negative incentives against increasing consumption [32]. It also revealed that consumer acceptance of incentive schemes depends on loss and risk-aversion as well as on how optimistic consumers are regarding their ability to save electricity.

Consistent with viewing leisure air traveling as a luxury, a representative survey of the adult UK population revealed that people are more willing to give up leisure air traveling than many other forms of consumption [33]. This finding was qualified by a qualitative study of 20 Australian travelers revealing that the availability of cheap flights in itself is an important reason for flying, but also that air traveling is supported by complex attitudes including a strong desire to visit distant places and cultures [34].

Nobody wants waste, making waste reduction an obvious target for behavior change. Especially research on the causes of food waste and how to reduce it has increased rapidly in recent years [29,35*]. Many of these studies still aim to identify and map the most important sources of food waste in private households [36,37] and in canteens and restaurants [38–40]. In general, food waste is the outcome of competing motivation combined with a lack of opportunities and abilities [41,42*], which especially calls for interventions that make it easier to avoid waste.

Substitution

Most substitution studies focus on consumer willingness to substitute less for more carbon intensive food products. Especially, many have investigated consumer willingness to replace meat by plant-based products [43,44] or alternative protein sources such as insects [45,46]. In general, consumer preferences differ, in particular their openness to replace meat by substitutes [47,48]. It is especially challenging to get acceptance for novel foods, such as food based on insect protein [49]. Promising solutions include tasty products and recipes, pricing, trial and availability and social influence [43,45]. Carbon footprint labeling can be an effective supplementary means to assist consumers who want to make climate friendly choices [50]. Climate communication with strong emotional content seems particularly effective for people with weak climate attitudes [51]. Brands' climate communication is more persuasive when messages are consistent with consumers pre-existing mental schemas and when backed with transparent, high-quality information [52].

Adoption

Studies on consumer willingness to adopt products with less carbon emission during use has focused mostly on electric vehicles (EVs) [53–56], energy efficient appliances [57–62] or climate friendly energy systems [63–66]. These studies typically employ either a reasoned action framework, based on some variant of the Theory of Planned Behavior (TPB) [67] and/or the Technology Acceptance Model (TAM) [68], or a variant of Roger's [69] diffusion of innovation theory. It is generally found that the acceptance of climate friendly products increases with consumers' environmental values and concern (i.e. value compatibility), perceived relative advantage compared to alternatives and perceived ease of use. In developing countries, low income and lack of awareness make low-carbon alternatives out of reach for a large majority of the population [70]. The implications for practice of these findings are obvious, but not necessarily easy.

Wrap up

The mounting research on consumer behavior and climate change is gradually improving our understanding of the most effective way to mobilize consumers to mitigate climate change. The relationship between consumer behavior and climate change is complex and individual consumers are not capable of identifying the behavior changes that are really worth doing to help the climate. Research has come a long way identifying the most impactful behavior changes, but more research is needed to refine and situate these insights. On the solution side, the most important implication of the behavioral research is that consumers need considerable assistance if they are to change to a climate friendly way of life. The biggest focus of governments and companies should be on making the climate friendly behavior the easy behavior by securing a correct reflection of carbon footprint in prices, climate friendly products that compare favorably to

climate unfriendly alternatives, and trustworthy and comprehensible carbon labeling to make it easier to make climate friendly choices.

This review of literature on consumer behavior and climate change was restricted to the very recent publications, published in 2019 and later. Note that the literature search was limited to a single academic database (Scopus) and to publications explicitly referring to climate change and consumer behavior in the title or abstract. The latter means that there could be other published studies, 2019 and later, that contribute to understanding climate relevant consumer behavior, but which did not explicitly refer to climate change and consumer behavior in the title or abstract or used a different terminology to refer to these phenomena. Note also in this connection that there can be differences in terminology across sector studies. For example, the reason why there appears to be more food and food waste research, relative to research on transport or energy-related behavior, could be that the terminology used for the literature search better fits the terminology used in food behavior than in transport and energy behavior research. The strong overrepresentation of studies from developed countries is hardly due to a sampling bias, since it is consistently found in reviews of this and related literature [71].

Conflict of interest statement

Nothing declared.

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Papers of particular interest, published within the period of review, have been highlighted as:

- of special interest
- of outstanding interest

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