

ADRIANA OLAYA RODRIGUEZ



MAKE
THEM
BEHAVE
SUSTAINABLY

Applying strategies to
design **sustainable**
consumer behavior

PREVIEW

Copyright © 2018 Adriana Olaya Rodriguez.

All rights reserved. This book or any portion thereof may not be reproduced or used in any manner whatsoever without the express written permission of the publisher except for the use of brief quotations in a book review.

ISBN: 978-1984221070

Front cover image by Adriana Olaya Rodriguez.

Book design by Adriana Olaya Rodriguez.

Editing by HappyMarli.

All illustrations and photographs by Adriana Olaya Rodriguez unless otherwise credited.

First printing, 2018.

www.makethembehave.com

PREVIEW

ABOUT THE AUTHOR

Adriana Olaya Rodriguez is a passionate design thinker. She graduated from the Pontificia Universidad Javeriana in Colombia with a BA in Industrial Design, followed by an MSc in Eco-Design from the Politecnico di Torino in Italy. Along with her academic background in systemic and sustainable design, Adriana has a proven track record in business storytelling and design research.

Even at her young age and in the early stages of her career, Adriana has provided strategic guidance and project delivery management on a broad range of projects for different types of organizations — from the retail sector, private companies, service industries up to the public and governmental sectors — including the European Commission, UNICEF, 3M, UNDP, and the Chamber of Commerce of Bogotá, among others.

She is a dedicated vegetarian, a sustainable lifestyle activist, an animal lover and a high-quality-service addict. Even as a child, Adriana explored her great curiosity concerning environmental aspects, which later (with her academic and professional experience) turned into a deep interest in systemic design and circular economy to achieve sustainable development.

In 2015, Adriana was selected to be the Sustainability Reporter of the Nudge Sustainable Hub to write reports about sustainable projects in Colombia and around the world. This was followed in 2017 by a fellowship in the program 'International Climate Protection Fellowship for young climate experts from developing countries' through the Alexander von Humboldt Foundation to conduct research on her two favorite topics: design and sustainable consumption.

ACKNOWLEDGMENTS

I would like to thank the Alexander von Humboldt Foundation, which funded my research stay in Germany, as well as *bauchplan* for their advice and support. I would also like to thank all the researchers, writers and organizations mentioned in this book that have been such a great source of inspiration for my work.

To all those in Colombia, Germany, Italy, Belgium and the USA who have kindly assisted this book in various ways—thank you! Above all, I would like to thank my family for their immeasurable support and for making me the person I am, someone who cares and who is committed to the planet, society and the environment. Thank you for being my inspiration, motivation, and the motor of my life.

FOREWORD by bauchplan).(

Adriana Olaya is a sustainable design thinker and doer. In this work, she presents a compelling and practical framework for how designers can use a holistic approach to address the severe and interrelated worldwide problems of unsustainable consumption and climate change. Adriana offers readers, students, business leaders, designers, and policy makers the tools, strategies, and practical pathways they need to successfully drive consumers towards sustainable consumption. Far more than a rhetorical exercise, this book is designed to inform, inspire, and affect action.

We, as a collective of urban planners and landscape architects, have engaged with the issue of bringing urban food production back into the everyday lives of metropolitan citizens for a long time. Herein, sustainable interaction between people and public spaces has played a crucial role. In 2009, bauchplan).(, as an interdisciplinary team, won a competition - wherein the goal was to create an urban food strategy - with our project Agropolis. This marked the beginning of a transnational movement to strengthen the awareness of soil as a resource, as well as the potential of green urban spaces and landscapes.

The overarching aim was to counteract urbanites' alienation towards their day-to-day consumption of food and to highlight the possibility of direct access to this valuable resource. Above all, however, it allowed the realization of sustainable behavior patterns that can be experienced through food and nutrition on a daily basis.

Over the years, we turned the fundamental aspects of this ambitious project into reality and actively participated in an integrative city development process, which resulted in our innovative outdoor supermarket, The Freiluftsupermarkt. The project sought not only to increase the awareness of soil as a resource, but also to promote a sustainable integration of people in their neighborhood. We became aware of our responsibility to create structures that allow social and ecological values to be balanced in equally sustainable measures in the spatial and conceptual realization.

Initiated in Munich and Vienna, the project brought together people from all over the world, from different age groups and nationalities, as well as from varying socioeconomic groups in one place with the purpose of sowing, weeding, harvesting and celebrating.

It was in the early stages of the project that Adriana Olaya joined us to not only conduct field research in the Freiluftsupermarkt, but also to actively participate in it. At that point, her interest in sustainable development driven by smart design solutions was already substantial. The project reaffirmed Adriana's perception that even just a single consumer could contribute to the sustainable management of resources through a conscious lifestyle, and that such mentality can also have an effect on other areas of life.

Since the beginning, our work has been to create spaces of possibility, places in which disparate needs are given space, next to and with each other. In our view, they should also possess so much potential for realization that autonomous adoption by their owners should be possible without being restricted by a narrow set of requirements.

As planners, our task consists not only of observing and adopting specific usage patterns, but also of developing a model for sustainable interaction with one's social and ecological environment.

Thus, a sustainable way of life is not a question of economic standards, but should instead be at everyone's disposal. Here, the role of the designer is crucial both in the context of landscape and design, because they are able to influence, push and advance the sustainable development agenda.

This is why Adriana's work is truly profound for us, our profession, as well as all those interested in sustainability. To host a Humboldtian at our office has been a great honor, to acknowledge not only how the topic of her research constitutes such an essential part of our work, but also the opportunity to measure our ideals in discussions and contributions on an international scale. Spending time and sharing knowledge with Adriana was a great pleasure, and we are extremely proud of her having reached an important milestone in her research.

We hope that for many of its readers, this book will demonstrate how important it is to put humans as the consumers of design at the core of any sustainability consideration, an experience that they can then use as a tool towards more sustainable everyday realities.

I	About the author
II	Acknowledgments
III	Foreword by bauchplan).(
1	Introduction
6	Definitions, vocabulary & terms
7	Basics
8	Sustainable consumption & the role of designers
10	Environmentally significant behavior and the threat of the intention-behavior gap
12	Sustainable lifestyle
12	Sustainable consumption
15	The role of designers in creating a sustainable future
18	Actors involved in the change
18	Government
20	Business
21	People
24	Barriers to sustainable consumer choice
27	Consumers, behavior and habits
29	Consumer types and characteristics
36	Factors influencing consumer behavior towards sustainability
40	Strategies to design sustainable consumer behavior
42	Consumer behavior change strategies
47	Sustainable design strategies

(NON INCLUDED IN THIS FREE VERSION)

Roadmap

Define desired behavior
Define target user/ consumers
Type of design intervention
Facilitator strategies to take
action
Concept/ design properties
Evaluation

Cases

Responsible consumption
of plastic bags in Colombia
Thursday Veggie Day in Ghent
Sweden repair incentive
The Keeper menstrual cup
Fairphone
Patagonia
Original Unverpackt
Recup
Freiluftsupermarkt
Partago
WagnisART

68	The change goes on...
70	Organizations cited
71	References Basics & Roadmap
80	References Cases
81	Icon copyright

INTRODUCTION

The enormous rise of globalization and capitalism has made it possible to produce more, cheaper and faster products; consequently, the life cycle of goods (products and services), from production, through consumption, to eventual disposal, is accelerated and shortened. The global economy is exceeding the sustainable carrying capacity of the planet, and this has been going on for some time. According to a report of the United Nations Environment Programme (UNEP)⁹⁴, global material extraction (non-metallic minerals, metal ores, fossil fuels and biomass) has increased substantially over the years. In 1970, the global amount of materials extracted was around 20 billion tons. In that same year, the global population was around 3.68 billion⁶⁹. By 2013, the population had reached 7.21 billion and the materials extracted had increased to almost 85 billion tons. In other words, during the same period of time, the global population almost doubled (1.9x), but the amount of materials extracted more than quadrupled (4.2x).

This trend is being driven by the escalation and expansion of the western consumer lifestyle, which is highly resource- and energy-intensive, and cannot be sustained due to the limited resources available to mankind. Calculations show that the planet has 1.9 hectares of biologically productive land per person available to supply resources and absorb wastes. However, the average person on earth already uses 2.3 hectares. These 'ecological footprints' range from the 9.7 hectares claimed by the average American to the 0.47 hectares used by the average Mozambican¹⁰⁴.

Americans and Western Europeans have primarily contributed to this unsustainable over-consumption rate for decades, but now, developing countries are catching up rapidly and contributing to the detriment of the environment and to climate change with their consumption patterns. By the year 2000, nearly half of global consumers resided in developing countries, including China and India—markets with the most potential for expansion, according to the Worldwatch Institute¹⁰⁵. Today, these figures continue to rise and will represent major consumption growth both in developed and developing countries.

To change these increasing, contemporary and unsustainable consumer societies, we must first understand how they work. After gaining these insights, we can develop new structures that facilitate practices of sustainable consumption. Our lifestyle decisions, especially concerning our consumption, are made within social, economic and political constraints. Those structures determine how easy or difficult, necessary or impossible it is to make a lifestyle decision. The challenge of achieving sustainable production and consumption strongly influences the design of more sustainable products, services, processes, strategies and consumption patterns (later in the book referred to as sustainable interventions) by policy makers, businesses and consumers alike.

In the industry, designers shape the development of products and services that directly impact society and the environment. According to the Environmental Change Institute ²¹, over 80% of the product-related environmental impact is determined during the product design phase. Along these lines, designers need to take moral responsibility for the outcomes of human interaction with products and services. Hence, the application of sustainable design strategies to promote sustainable consumption and lifestyles reduces not only the life cycle impact, but also the consumer ecological footprint. Therefore, the main challenge is to design the use phase of products and services in a way that makes consumers link available information, their behavior and the environmental and social impact.

The key role of designers linking manufacturing processes and consumers is not limited to the design of products and services; they must also seek alternative solutions to the wasteful lifestyles of contemporary society. Their role is to influence positive change through the creation of more responsible and sustainable interventions and goods.

This book is intended to offer readers an integral perspective about strategies to change consumer behavior and promote sustainable consumption. It combines theories, concepts and methodologies from a variety of disciplines to facilitate the conception and design process of sustainable products, services, processes, strategies and consumption patterns, from start to finish. Taking into consideration the variety of consumer types and the process that the human brain undertakes to perform any behavior, from the internal and external factors that influence it, to the motivation, ability and prompts necessary to perform it, this book explains sustainable design and consumer behavior change strategies and instruments. Using the roadmap tool, it suggests a path for readers to follow that will ease both their understanding and the practical process.

With this book, I hope to inspire constant improvement to make a real difference for the environment, the people, the economy and the planet. I invite you to always keep in mind that we are all in this together. We need a global commitment to sustainability if we want to live in a responsible, safe and prosperous world, and most importantly, if we want to give this to our children and future generations. Designers, entrepreneurs, business leaders, creatives, marketers, policymakers and

anyone else who has the power to influence or change the living conditions of one person, or an entire society, must act ethically, thinking about the well-being of the people and the environment. We must stop and reflect: What am I doing to make this world a better place? What is the impact of my actions? How can I ensure better living conditions for the people and the environment I influence with my work and behavior? In that moment, every one of us has the power to make a positive change.

There is no doubt that for me, writing this book was a labor of altruism, love, and commitment for a sustainable future.

For you, I hope reading it will be as well.

PREVIEW

This book is divided into three main sections. **BASICS** presents the fundamental concepts based on a literature review concerning consumer behavior, human behavior and habits. Furthermore, (design) strategies and instruments are promoted for more sustainable consumption. Given this knowledge, the subsequent section, **ROADMAP**, develops a tool to assist the design process in order to produce sustainable and innovative solutions to change consumer behavior. The **CASES** section highlights different companies, projects and governmental strategies that are forerunners in terms of sustainable production and consumption strategies.

DEFINITIONS, VOCABULARY & TERMS

Designers: In this book, I refer to designers in a broad sense as anyone that is in charge of designing a product, process, marketing campaign, intervention or event, among others. The term includes all those who change the environment with the inspiration of human creativity, especially industrial designers or service designers, but also anyone who is implicit in the conception and realization of human needs, desires and satisfiers (the means by which people satisfy fundamental human needs).

Sustainable consumption: The definition proposed by the 1994 Oslo Symposium on Sustainable Consumption defines this as “the use of services and related products which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials, as well as emissions of waste and pollutants, over the life cycle of the service or product so as not to jeopardize the needs of future generations.”

Sustainable development: Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It aims at a positive environmental, social and economic balance.

Service design: An emerging design field focused on the creation of well-planned experiences using a combination of intangible and tangible mediums that also determine the compound impacts of it, routing development, and how future decisions are made. Service design as a practice generally results in the design of systems and processes aimed at providing a holistic service to the user. This cross-disciplinary practice combines numerous skills in design, management and process engineering. The work of the designer is highly focused on the touch points where the user interacts with the design. It is mostly through these points that a designer can influence the outcome of the service and the behavior of the user.

Eco-design: The design of a product or service that applies environmental criteria aimed at the prevention of waste and emissions, as well as the minimization of their environmental impact, throughout the life cycle of the product.

Sustainable behavior: Using a product or service in a way that has less of a negative and harmful impact on the environment and reduces the consumer ecological footprint, in comparison to conventional ways of using similar products or services.

Design for Behavior Change (DfBC): is a design field that acknowledges designers' responsibility and attempts to facilitate a shift in the everyday choices of the population to create a positive change and to close the so-called 'value-action gap' between people's attitudes, which are often pro-environmental, and their everyday behavior. Behavioral Design is being applied to solve challenges related to consumer behavior, organizational behavior and public behavior.

Sustainable interventions: In this book, I refer to this term as sustainable products, services, processes, strategies and consumption patterns.

Intention-behavior gap: This gap refers to the difference between the intention and the actual result of the behavior. For example, although some people may develop the intention to change their behavior towards sustainability, they might not take any action for various reasons.

BASICS

fundamental concepts based on literature review

SUSTAINABLE CONSUMPTION & THE ROLE OF DESIGNERS

Each year, 1.3 billion tons of food, equivalent to one-third of all food produced – worth around \$1 trillion – ends up as waste, partly in the bins of consumers and retailers. According to the UN⁹¹, modern households consume 29% of global energy, which represents 21% of total CO₂ emissions. Disturbing facts like those are the reality, not only of the food and energy sector, but of almost every resource we consume: water, soil, technology, clothing, household products, transportation, meat, etc. Now imagine the increase in these figures in the future. Globally, more people are expected to join the middle class over the next two decades. This is certainly good for individual prosperity and the global eradication of poverty, but at the same time, it will increase the demand for the planet's already constrained natural resources.

Until now, the main sources of ecological impact have been production processes and the material selection of products and services. However, today's social reality related to climate change is reshaping this condition. Preventive measures for a sustainable future also consider the configuration of products and services with respect to how they are designed to be consumed. In order to successfully change, the challenge lies in the shift of the concept and trajectory of how societies have been created and shaped.

This shift implies a change in the expectations of how the future of living, working and consuming should look. It also requires a massive redesign of products and services, industrial practices, policies and consumer lifestyles to offer people the means to express their chosen identity in a sustainable way.

According to the Brundtland Commission, sustainability encounters a set of guiding principles and key objectives, particularly the acceptance of limits and the priority for satisfying human needs without compromising the ability of future generations to meet their own needs¹⁰².

For this reason, sustainable development requires that policy makers, industry leaders and the mainstream population adopt and promote lifestyles based on the limitations of ecological resources.

Therefore, both in industrial and governmental institutions, designers play a crucial role in ensuring more sustainable consumer habits and lifestyles. As mentioned before, the highest percentage of the product-related environmental impact is generated by the product design phase.

More precisely, designers are able to bridge the intention-behavior gap, which defines the difference between the intention of consumers' environmental values and

the actual result of their behavior in everyday actions⁷⁹.

To address this situation, actions to reduce greenhouse emissions and the environmental impact of products and services should engage the whole life cycle. For many goods, the use phase contributes the most to the total environmental impact, but designers are now being challenged to reduce the impact by applying strategies to design sustainable consumer behavior⁴⁵.



Environmentally significant behavior and the threat of the intention-behavior gap

The first step in changing unsustainable lifestyles and decision-making, for both consumers and producers, is to understand the real impact of their behavior on the environment. Stern ⁷⁴ defines this as environmentally significant behavior based on two different perspectives. The first recognizes environmentally significant behavior as having a positive or negative impact on the natural environment, considering the real and factual impact of it. The second perspective takes the consumer perspective, namely the intent to act in an environmentally significant way, most often with the aim of having a positive impact. That means this second perspective relates to consumers' thoughts about the positive or negative impacts of their behavior without having sufficient, correct or concrete information about it.

Stern sees these two perspectives as a contradiction that leads to a gap between what people think is environmentally significant and the total impact that can be attributed to the behavior over the entire life cycle.

For example, many Germans have increased their organic product consumption, as they want to minimize their contribution to the impact of chemical pesticides and fertilizers on the environment. However, in many cases, the long-distance transport, processing, large amount of plastic packaging and the distribution of this organic food produced in distant countries will have a higher impact on the environment than if no organic products were involved. Thus, consumer behavior inevitably becomes detrimental to the environment.

Imported organic vs. Local conventional.

A study performed in 2011 on the significance of transport for the carbon footprint of imported organic plant products found that organic soybeans from China imported to Denmark have a higher carbon footprint than local conventional production of the same product ⁸⁷. With a focus on the environmental effects of the farming systems, the results show that the organic soybeans produced in the case study area in China have a lower environmental impact than conventional production with regard to greenhouse gas emissions, nutrient enrichment and use of non-renewable energy. Half of the carbon footprint from organic soybeans from China was related to transport. This finding is in agreement with British studies, which showed that transport accounted for approximately 40-70% of the carbon footprint of imported plant products transported by ship and/or truck. However, the carbon footprint of every product varies according to the production system, the resources activated and the mode of transportation.

The gap discussed earlier between the actual environmental impact of a behavior and what people think it entails can be due to insufficient knowledge about the general environmental impact of consumption, as well as their own consumption habits, in particular.

Another misstep with respect to environmentally significant behavior is to focus

perception on the few areas in which the behavior is more sustainable, ignoring other areas in which the behavior is less sustainable. For example, a person might feel quite sustainable in their behavior by separating their trash for recycling and taking public transport to work. However, at the same time, that person might ignore the impact caused by their frequent use of air travel⁷⁵.

Similarly, some industries have the good intention of replacing less environmentally friendly materials without accounting for the entire life cycle. In some cases, although the new materials have better properties in terms of recyclability and reusability, the extraction of the raw material might be more harmful to the surrounding ecosystems and/or the transformation requires significant amounts of energy and resources. Consequently, the companies' introspection in terms of positive environmental impact increases, but their actual impact is more negative than before. It is therefore necessary to establish a better and deeper understanding of the impact to generate awareness of the environmental significance of the behavior.

Aluminum vs. Glass

Bottled and canned drinks are a big business worldwide. The use of aluminum as a substitute for glass bottles has been growing in the market in recent years as a more sustainable substitute for the packaging of beverages. For these two materials, the extraction and manufacturing processes have the largest environmental impact.

On the one hand, glass is made from non-renewable resources: sand, silica and limestone. This material requires energy to heat them to 1200°C in a furnace during manufacture. In addition, despite the recyclability properties of glass, its heavy weight increases the CO₂ emissions due to the fuel needed for transportation. On the other hand, aluminum is made from bauxite, mined from open-pit or dredging mines, which have several damaging environmental impacts. Aluminum processing is water- and energy-intensive and produces a variety of pollutants. Primary aluminum production accounts for more than 90% of the total environmental footprint of making aluminum cans. Aluminum can be recycled repeatedly without limit. This recycling factor and its lightweight nature is what incentivizes so many industries to use aluminum. Despite its recycling potential, Annie Leonard, the founder of the Story of Stuff⁴⁷, notes that only 45% of cans are currently being recycled.

The beverage industry, in order to increase environmentally significant behavior, must select the material by considering that if aluminum cans are made from 100% recycled aluminum, it's the best choice for the packaging of drinks. If the material is not recycled, glass bottles have a lower carbon footprint, especially if the bottles are refilled and the distribution distance is short.

Sustainable lifestyle

To achieve a significant collective change in how societies are shaped, we must reconsider many aspects of our personal lifestyle and examine our daily consumption habits. Durning¹⁹ considers the questions of how much is enough and what level of consumption the planet can support. In 2017, the Earth Overshoot Day fell on August 2²⁰. This day marks the date when humanity has exhausted nature's budget for the year. It means that we used more from nature than our planet can renew in the whole year, due to overfishing, overharvesting forests, and emitting more carbon dioxide into the atmosphere than forests can sequester. In other words, in 2017, we lived in debt to the planet and our natural resources in just over half a year, exhausting and deteriorating the planet without the possibility of recovering the only source of resources we have to survive – Earth.

With psychological studies, Durning argues that, according to data, consumption is not a main determinant of happiness. Instead, it is prominently related to family life and work satisfaction, leisure and friendship.

In his opinion, technological change will need to be complemented with curbing our material wants. It is evident that today's western consumer lifestyle is opposed to long-term social and ecological sustainability⁹⁵.

Sustainable consumption

Consumption involves the selection, purchase, use, maintenance, repair, disposal and recycling of any product or service⁴⁴. Although consumption tends to be a major part of the life cycle by definition, it still does not receive appropriate attention with respect to sustainability. The focus is still largely on the improvement of production, but not the consumption patterns. For instance, the energy sector is presently developing new technologies to generate cleaner and more efficient energy in order to produce more and satisfy the high market demand with lower CO₂ emissions. However, the problem should not be addressed by producing more efficiently and therefore being able to consume more, but rather by decreasing overall consumption. In other words, emissions should be decreased not only through the use of renewable technologies, but also by the amount being consumed.

According to this principle, the SustainAbility team published its findings about the market implications of sustainable lifestyle research in a report with the title: *Who Needs It?*⁷⁶. The message was that people should not just buy greener, but buy less, suggesting that consumption should be driven by needs over wants. Certain goods and services are simply unnecessary, while others are consumed in excess. There is also a trend of unsustainable shopping on a global scale. One of the challenges is to meet non-material needs through non-material means; by buying less and deriving satisfaction elsewhere, this can be achieved.

Sustainable consumption and production (SCP) is “the use of services and related products, which respond to basic needs and brings a better quality of life while minimizing the use of natural resources and toxic materials, as well as the emissions of waste and pollutants, over the life cycle of the service or product so as not to jeopardize the needs of further generations”.

- The Oslo Symposium in 1994

Max-Neef⁴⁹ classifies fundamental human needs into two categories: existential and axiological. The existential needs are Being, Having, Doing and Interacting. The needs of Subsistence, Protection, Affection, Understanding, Participation, Creation, Leisure, Identity and Freedom are classified as axiological. The means by which humans satisfy these needs are the satisfiers.

According to this categorization, food and shelter must be considered satisfiers of the fundamental need for Subsistence, not as basic needs. In the same way, any kind of education and the education system, in general, are satisfiers of the Understanding need.

There is no one-to-one correspondence between needs and satisfiers. A need may require various satisfiers to be met, or conversely, a satisfier may satisfy different needs. These relations may vary depending on time, place and circumstances. The choice of satisfiers is a main aspect that defines a culture. Each economic, social and political system adopts different systems and methods for the satisfaction of the same fundamental human needs through the generation (or non-generation) of different types of satisfiers. No matter which society a person belongs to, the fundamental human needs are always the same. What changes is the choice of the quantity and quality of satisfiers. Therefore, what is culturally determined are the satisfiers, rather than the needs. Cultural change is, among other things, the consequence of discontinuing or changing traditional satisfiers.

Obviously, many needs are best satisfied by non-commercial services, such as family care or being among friends, rather than by products. However, in the capitalist world in which we live, sustainable design, production and consumption should be understood as choosing true satisfiers, rather than about neglecting needs.

For this reason, designers play a key role in defining and providing satisfiers that fulfill both the needs of the market and the goals for sustainable development, which largely depends on awareness of the importance of sustainable consumption.

The role of designers in creating a sustainable future

In 2016 each of the 195 member countries of the United Nations Framework Convention on Climate Change (UNFCCC) signed the Paris Agreement. The agreement deals with greenhouse gas emission mitigation and adaptation. It establishes the goal of strengthening the global response to the threat of climate change. In this century, the global temperature rise should be kept well below 2 degrees Celsius above pre-industrial levels.

In order to meet this goal, each country must determine, plan and regularly report its own contribution to mitigating global warming.

This means that, aside from other measures, sustainable consumption and the production of tomorrow to meet the 2030 Sustainable Development Goals (SDGs) requires a massive redesign of consumer goods and industrial practices of services and infrastructures in order to reach the goal.

According to the 2030 SDGs, the so-called 'Responsible consumption and production' goal intends to promote resource and energy efficiency, sustainable infrastructure, and provide access to basic services, green and decent jobs and a better quality of life for all ⁹².

"Sustainable consumption and production aims at 'doing more and better with less,' increasing net welfare gains from economic activities by reducing resource use, degradation and pollution along the whole life cycle, while increasing quality of life. It involves different stakeholders, including businesses, consumers, policy makers, researchers, scientists, retailers, media, and development cooperation agencies, among others.

It also requires a systemic approach and cooperation among actors operating in the supply chain, from producer to final consumer. It involves engaging consumers through awareness-raising and education on sustainable consumption and lifestyles, providing consumers with adequate information through standards and labels and engaging in sustainable public procurement, among others" (United Nations, 2018).

Previous studies ^{50, 88} have reviewed the activities of designers, demonstrating their key role in linking the manufacturing process and consumers. Both industrial and service designers play a significant role in seeking alternative solutions to the wasteful lifestyle of contemporary society, and in influencing positive change through the creation of more responsible and sustainable goods.

We (Countries) commit to making fundamental changes in the way that our societies produce and consume goods and services. Governments, international organizations, the business sector and other non-state actors and individuals must contribute to changing unsustainable consumption and production patterns, including through the mobilization, from all sources, of financial and technical assistance to strengthen developing countries' scientific, technological and innovative capacities to move towards more sustainable patterns of consumption and production. We encourage the implementation of the 10-Year Framework of Programmes on Sustainable Consumption and Production. All countries take action, with developed countries taking the lead, taking into account the development and capabilities of developing countries.

*- Goal n.12 Paragraph 28 of the
2030 Agenda for Sustainable
Development*

With those facts in mind, experts have stressed that design education should be redirected to the development of an ethical designer^{25, 24}, one who could rethink and radically design interventions that redirect environmental problems. This means that designers need to take ethical and moral responsibility for their own actions, due to the consequences of human interactions with artifacts, goods and services.

If you are creating an intervention that will be liberally distributed, used, and will probably end as waste around the country or across the world, then it is crucial to ask yourself ethical questions like why, when, how, and what happens next. Unfortunately, sustainability plays a minor role in design education and practice thus far, because design is still not recognized as a relevant factor in the sustainability discourse.

However, design as a tool for consumer behavior change, with sustainability as its purpose, has recently gained considerable interest. This slow process of change is due to the essential action of choosing the right design intervention and strategy for each particular combination of behaviors and individuals.

Conventional sustainable design approaches mostly participate in reducing environmental impact by implementing product-focused strategies. These strategies mostly concentrate on technological and material properties, such as the use of recycled or recyclable materials during manufacturing, increasing resource efficiency, effectiveness, and achieving product longevity.

Nevertheless, the way people use a product contributes immensely to the negative impact on the environment as never seen before. For instance, researchers found that the majority of the impact of products can be attributed to user behavior^{51,103}. Thus, promoting sustainable consumption practices is crucial for sustainability, going hand in hand with designing sustainable products and services. These sustainable consumption practices and pro-environmental behaviors can be derived from a huge range of actions, such as minimizing resources and energy consumption, recycling, using sustainable modes of transportation, being a member of an environmental institution, etc.

It is indeed true that designers have both the opportunity and the relevant skills to develop such products to enhance positive behavior change, especially when playing an active role in the intervention development process, particularly in the early stages. A systemic way to scale up and mainstream sustainable consumption is to design and provide interventions that promote these three principles: (a) the sharing of goods and services; (b) the downsizing of goods and services by consuming less; and (c) the shifting towards more resource-efficient products and services (sustainable production).

In the literature about Design for Behavior Change (DfBC), Design for the Environment (DfE) and Design for Sustainability (DfS), many strategies and instruments can be found to help designers promote more sustainable consumer behavior. Some of these instruments will be explained in the following chapters.

ACTORS INVOLVED IN THE CHANGE

In society, there are always three main groups linked with the products, services and infrastructures that people use: people, business and government. They represent the Triangle of Change. According to the Sustainable Consumption Roundtable report *I will if you will*⁷⁹, these three groups fundamentally have the clout to embed more sustainable consumption habits. Government and business have the major responsibility to focus their strategies, policies and innovations towards mainstream consumers to achieve sustainable development. The responsibility to change the market should not exclusively lie on the already more sustainable consumers.

By making sustainable products the norm, the government and industries can enable consumers to make sustainable choices. In this way, people who are ready and willing to change their behavior in favor of climate protection and sustainable consumption will have support from the newly introduced policies to achieve this goal. Consequently, the circle of action will be enlarged. People seeing others acting around them and feeling that their efforts are worthwhile will boost their motivation to continue acting sustainably.

A combination of incentives, community initiatives and local feedback will reassure people that they are part of a collective movement that is making a real difference, rather than thinking they are a minority making efforts without any impact.

Government

New interventions and technologies require modifications in the market and a change in business practices.

Political leadership is crucial to encourage more sustainable consumption habits. The purpose of public policy on sustainable consumption should be to encourage, enable, and engage governments, municipalities, the business sector and civil society to make it easier for consumers to act sustainably and move progressively towards sustainable development.

With the creation and application of a Sustainable Consumption Action Framework (when the master framework changes from theory to action using principles, procedures and structure), governments change consumption habits and promote sustainable ones through supportive policies and practices. The aim is to shift values in society and create profitable opportunities for all companies to deliver more sustainable services and products.

In other words, a Sustainable Consumption Action Framework (SCAF) is a guide for policy makers that enables behavior change. A successful SCAF consists of five elements, according to the Sustainable Consumption Roundtable report ⁷⁹:

1. **Use the mandate for action.** A governmental mandate can contribute significantly to help people change their behavior. People seem ready and willing for the introduction of new policies that guide them to change their behavior in favor of climate change challenges. They are hoping that the government will make it easier for them to act sustainably.
2. **Focus on behavior.** Policy action needs to be grounded in an understanding and awareness of consumer behavior. At the same time, there exists a need to identify and set priorities around the behaviors that need to be encouraged or sustained. For example, people need to see symbolic and effective solutions in their everyday lives to be encouraged to act more sustainably. Some actions create a stronger commitment to sustainability than the action itself, rippling outwards by opening people's minds to different ways of doing things.
3. **Place products and services at the centre.** Collaborative partnerships between business and government are critical to make sustainable products and services the norm. It is crucial that policy-makers set long-term sustainability 'roadmaps' for products and services to drive the evolution of the industry towards sustainability.
4. **Build collective actions.** The role of governments is to facilitate collective responses to collective problems that cannot be solved by individual choice. It is extremely hard to deviate widely from the collective norms individually. In other words, governments should act as a collective action facilitator to help people solve shared problems.
5. **Widen the mandate.** Along with the progress, it is recommended to change and foster the mandate. Interruptions to reflect further action are appropriate, as this can help to resolve many complex challenges. After all, there are many tensions, trade-offs and dilemmas at the heart of such a complex challenge as sustainable consumption.

Implementation of 4E's strategy in the UK.

In 2005, the government signed up for a Sustainable Development Strategy based on the four Es – Exemplify, Enable, Encourage and Engage people and communities in the move towards sustainability.

The government recognized the need to lead by example and make interventions tangible, fair and the norm ⁹⁰.

The strategy of the government emphasized that engagement requires a real commitment to community action, deliberative processes and involving people in changing the perspective on their own terms. This is seen as better than a one-way process of communicating and relying on conventional persuasion.

An example of the achievements of the strategy put in practice was London's congestion charge. A combination of charging, combined with the increased provision of buses, was introduced with accompanying publicity. The effects have been far greater than originally forecast. There has been a 30% reduction in congestion as people consider alternatives, including public transport, with an increase of 29,000 bus passengers entering the zone in the morning peak times.

Similarly, the Swedish government is taking systemic actions to promote sustainable consumption and production transition. The government's strategy for sustainable consumption aims to contribute to environmentally, socially and economically sustainable consumption focusing on these main areas:

Increasing knowledge and deepening cooperation, encouraging sustainable ways of consuming, streamlining resource use, improving information on companies' sustainability efforts, phasing out harmful chemicals, improving security for all consumers and focusing on food, transport and housing³².

The role of governments must be to stimulate, in a supervisory and legislative way, sustainable consumption and production in both business and citizens. Through policies and public awareness, governments can influence consumer habits and production processes towards sustainable actions.

Business

Businesses as providers of products and services play a critical role in the creation of more sustainable innovation. Businesses that are prepared to make strategic low-carbon actions and provide sustainable services and products have the opportunity to shape and lead the market. By setting a trend, competitors and other sectors of the market will consequently tend to follow where they see a business case to finally achieve global transformation of the market.

On the one hand, businesses will have to choose new corporate responsibility towards sustainable consumption. In order to do so, the businesses' approach should implement the following principles:

- Make the transformation of their business strategy evident with new principles of sustainable consumption.
- Analyze the environmental and social impacts on the entire life cycle of interventions.

- Have proactive engagement with the government and NGOs to develop public policies that stimulate more sustainable products.
- Research and develop strategies focused on product sustainability.
- Design features that help consumers use their products or services in more sustainable ways.
- Implement marketing strategies that appeal to people's values and ethics, and a broader sense of well-being, and avoid creating new unnecessary and unsustainable wants.
- Create partnerships with innovative enterprises to develop more sustainable products or service approaches.

On the other hand, businesses must also have a coherent and sustainable supply chain. This helps to ensure continued improvement of stakeholder value. By achieving a reduction of resource use from the supply chain, such as energy, water or materials, there will be significant cost savings.

These savings can be transferred to consumers and can reduce the product cost, which helps in reaching a mainstream population, rather than only offering expensive, luxurious and unaffordable products to small and wealthy markets.

There is an opportunity to promote business stability and innovate by being proactive towards governmental priorities and by operating efficiently within regulatory boundaries. This gives businesses the opportunity to influence the policy agenda in the increasing movement of environmental regulations for climate protection all around the world.

Likewise, while encouraging sustainability outwards, it is also essential to pass the sustainable values inwards to employees and potential employees, in order to increase morale and efficiency. This will create satisfaction and attraction in employees to help society meet its aspirations of responsible and sustainable behavior.

In other words, sustainability should be embedded in the culture, philosophy and values of every single cell of the business, both inwards and outwards.

People

One of the biggest challenges of sustainable development is to reach the mainstream population. In 2004, fewer than one in three people had heard the term 'sustainable development' and even fewer of that group could explain what it means¹⁸.

For a sustainable future, it is necessary to involve consumers more and raise awareness about the connection of their daily choices and the consequences in the world around them.

Changes in the production of goods and services cannot do all the heavy lifting necessary to make the sustainable consumption and production transition. Changes

in the attitudes, values and behavior of consumers matter too. More consumers who care about their carbon, water and land footprints and about what happens at the far end of long supply chains – and who make their purchasing decisions accordingly – are indeed essential.

Consumers' daily choices and behaviors have a major fundamental impact on the environment in four main areas:

- How we manage our homes (energy and water consumption)
- The food we consume (food)
- How we get around (short-distance mobility)
- Holiday or business travels (long-distance mobility)

Greater awareness and responsibility among consumers about their everyday consumption patterns can put pressure on producers to move their own operations and their suppliers towards sustainability and simultaneously give politicians and governments the political space to enact the regulations, policies and market instruments that drive society towards a sustainable future.

The Forum ⁷⁹ provided four key guidelines that can be applied both by businesses and by the government to make sustainable habits and choices easier for those consumers who choose to take action in these areas:

1. **Make it fair.** Consumers are highly motivated to contribute to global fairness with the products and services they consume. However, people want to be sure that interventions are fair and not open to abuse by free riders or manipulation by 'rich' people ^{36, 6}. When the polluter pays in equal proportion for their negative impact, consumers perceive the intervention as being fair.
2. **Help people act together.** People want assurance that, with their behavior, they would be acting in collaboration rather than isolation. To make interventions that prompt new behaviors, they need to become 'social norms' to be truly effective and successful ^{35,40}.
3. **Make it positive and tangible.** People get more engaged when they can see the positive consequences of their choices, rather than the negative impact. People like to do (and make visible to everyone) positive and tangible actions.
4. **Win the trust of people.** Transparency helps to overcome the normal tendency of people to be skeptical about the motives of the government and businesses. Above all, interventions need to communicate that they are motivated by environmental concerns, rather than the economic interest of raising revenue. Likewise, businesses and governments should promote sustainability not only with the interventions created for people, but also by having sustainability as a core of their corporate identity and setting the example with their own acts and internal processes.

To achieve community action and consequently a great positive impact and change, real individual engagement and the commitment of consumers is required. Therefore, it is imperative to utilize deliberative processes that involve people in changing their perspective on their own terms. This, above all, is due to their great power to influence the market and change consumption and production patterns. This is why it should not just be a one-way process of communicating and relying on conventional persuasion, but rather an integral approach to eliminate barriers and ensure that consumers get informed, choose, consume and behave more sustainably.

PREVIEW

Barriers to sustainable consumer choice

Consumers play a major role in making products and services more sustainable. Their choices have a great impact on which goods exist on the market. Their behavior determines when, how, where and what is being produced. Besides regulations, market forces are a major driver in the way industries develop. Consumers can now demand new standards for corporate behavior and a higher commitment towards the purpose of producing more sustainably, not just making a profit. This means that by buying and consuming, consumers can 'reward' more sustainable services and products, or 'punish' less sustainable alternatives. This gives great power to consumers to create a breakpoint in the chain and influence the market and the industry about what and how is being produced.

One major problem is that sustainability is a broad and abstract concept with many definitions, and it is not clear for many people. In general, consumers perceive sustainability as a positive thing and may have a forward-looking attitude towards central components of sustainability, such as environmental protection; however, there is a high tendency towards the intention-behavior gap.

Acting positively towards sustainability and buying less sustainable products or services is not necessarily a contradiction. For instance, in the UK, 30% of people claim to care about companies' environmental and social records, but only 3% reflect this in their purchases¹⁷.

The fact that the sustainability of a service or product cannot always be checked by consumers, as it cannot be seen, tasted or felt if it has been produced in a more sustainable way, often makes it difficult to make decisions towards sustainable options. For this reason, sustainability turns into a reliance characteristic of goods and trustful relations with the brands and industries consumers choose.

Therefore, making a clear and comprehensible communication strategy of the sustainable aspects of goods is crucial. Lately, eco-labeling – the transmission of sustainable information on the label – has been used more and more for this purpose²³. There are many kinds of eco-labels on products, services and processes that mostly cover certain aspects of the broad sustainability concept. Some of the most known and used labels designate the carbon footprint, local production, organic production, environmental protection, fair trade, animal welfare and other aspects of the production process, as well as the origin of raw materials.

However, eco-labeling and informative efforts are not enough to persuade consumers to act more sustainably. There are a number of frequent barriers in the decision-making and purchase process that can be prevented to affect consumer choice, which will encourage more sustainable alternatives to be chosen above others in the marketplace.

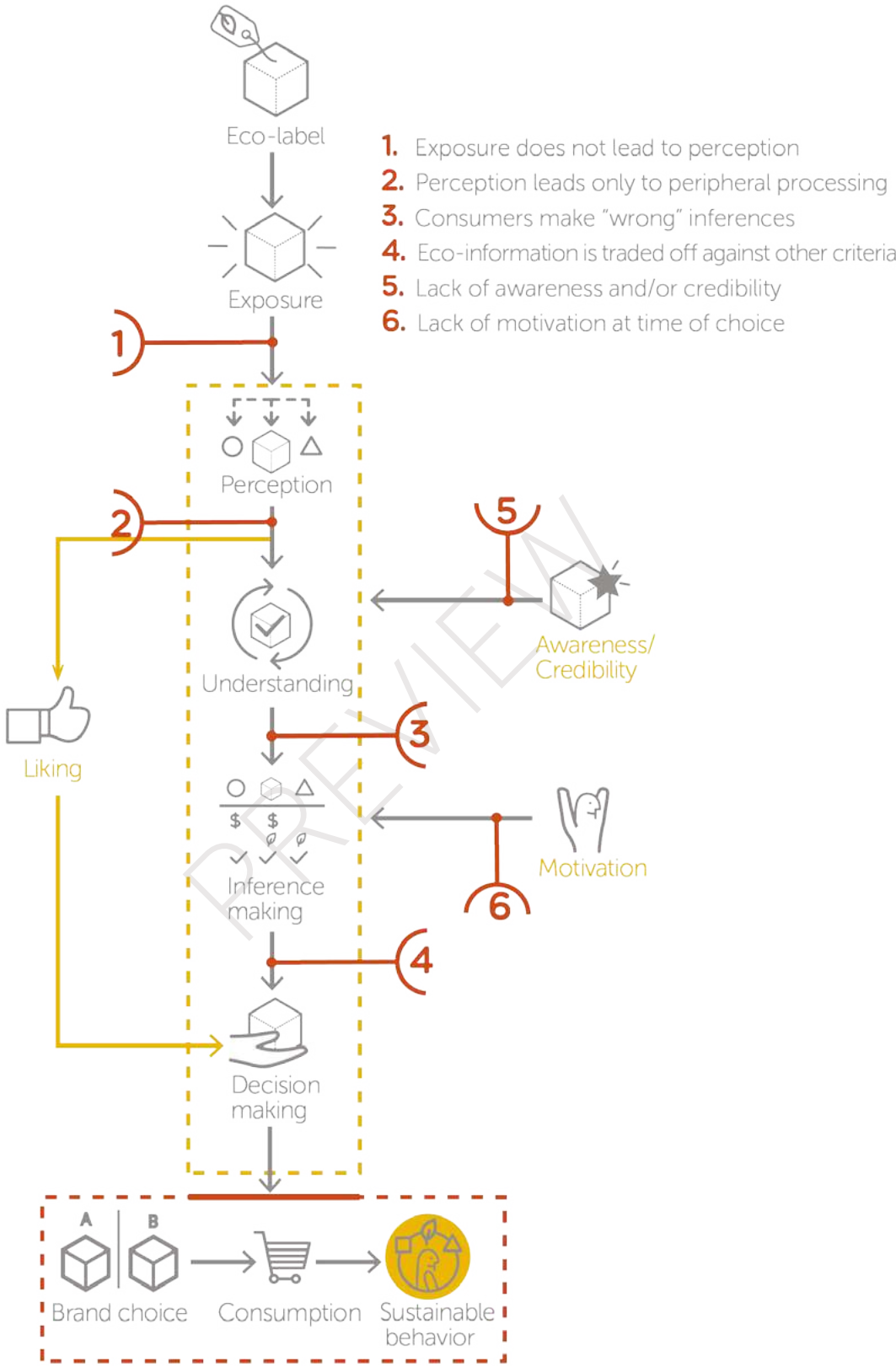
Klaus Grunert³³ points out six barriers to sustainable consumer food choice that can also be transposed and applied to different goods in different sectors with sustainable labels and information. He exposes the reasons why a consumer might not

choose a more sustainable option, or not make such an option a recurrent choice. To influence consumer choice based on the sustainability of the intervention, consumers need to perceive the sustainable aspects, attach some form of understanding to them, and decide what these aspects mean for them. They need to be aware of their decision-making, to ensure that the sustainability will not be traded off against other criteria.

The whole process is affected by whether consumers are aware of the sustainable aspects, label, information provided and if they find it credible. It also depends on their values and intention towards sustainability. This must be translated into motivation to choose sustainable options at the time of decision-making and purchase. Based on this framework, Klaus G. concludes his work with the following six possible barriers:

1. **Exposure does not lead to perception.** Consumers simply do not notice the label, because they are time-pressured when shopping and most purchases are made habitually.
2. **Perception leads only to peripheral processing.** Consumers see the label, but do not care to make the effort to understand what it means. It may still affect their choices, though.
3. **Consumers make ‘wrong’ inferences.** Consumers do see the label, make an effort to understand what it means, but draw the wrong inferences. They may end up buying the product, but may do so for the ‘wrong’ reasons.
4. **Eco-information is traded off against other criteria.** Consumers prioritize other aspects of the product over sustainability. The price may be higher, the taste is not as good, the rest of the family prefers something else, etc.
5. **Lack of awareness and/or credibility.** Consumers who want to make sustainable choices may find it hard to carry them out in practice.
6. **Lack of motivation at time of choice.** While consumers have a positive attitude towards sustainability, this attitude is not strong enough to affect behavior in all situations where sustainability may be a criterion. We can say that consumers ‘forget’ about their positive attitude regarding sustainability when making choices. Such ‘dormant’ attitudes are a major factor in explaining discrepancies between attitude and behavior.

These barriers can be translated and applied not only to eco-labeling, but also as general barriers to sustainable consumption at the moment of making a choice whenever the consumer is about to buy or decide between a sustainable alternative and a less sustainable one. The barriers can occur when people gain information about a product themselves, when buying online, or when they are persuaded by word-of-mouth marketing strategies. All of these occur without having any contact with the label.



CONSUMERS, BEHAVIOR AND HABITS

Consumption is a broader activity that, besides purchasing, is also reflected in rituals of use and concrete or symbolic modification of goods. Products and services acting as interfaces between consumers and consumption activities give immediate and direct responses to users when being operated: perception, learning process and use. Designing a service means, among many others, designing a user experience that determines the compound impacts of it and how future decisions are made.

In order to make consumers perform a planned sustainable behavior, it is crucial to have a better understanding of what they do, and how they interact with products and services, as well as the hidden factors behind their daily decision-making process.

In recent decades, many theories have tried to explain the factors that contribute to behavioral change. For instance, Triandis⁸⁵ proposed an integrated model of interpersonal behavior that includes social factors and emotions in forming intentions. It also highlights the importance of habits as a mediated factor related to behavioral change.

Jackson⁴⁰ states that a behavior only becomes habitual when the behavior is 'highly automated,' meaning that the behavior is performed with minimum cognitive effort, resulting in limited awareness during the interaction. Grabbing our usual brand of detergent in the supermarket, following a specific route when traveling to work and drinking coffee in the morning to start the day are habitual behaviors; what they have in common is that they are performed with a minimum amount of thinking.

Habits, as defined by Verplanken and Aarts (cited by Verplanken and Wood¹⁰¹) "are learned sequences of acts that have become automatic responses to specific cues, and are functional in obtaining certain goals or end-states." In other words, habits are actions learned and performed as a routine to achieve a specific goal, for instance, always turning off the lights after leaving the room to lower the energy bill. There are three stages in the formation of a new habit:^{2,63}

1. **The declarative stage:** the individual encodes information relevant to the behavior as a set of facts.
2. **The knowledge compilation stage:** the information is converted from declarative to procedural and conscious attention to the information is gradually reduced.

- 3. The final procedural stage:** the habit is formed and performed with lower amounts of attention.

Many unsustainable behaviors are habits rather than active choices. In order to encourage consumers to break old habits, two factors are suggested: repetition and reinforcement. To make people break a habit in the first place, it is critical to understand who they are, why they behave the way they do, and most importantly, why and how the old habit was formed.

It is indeed important to create consistent behaviors over time that can lead to sustainable habits. Mainstreaming sustainability starts with creating sustainable habits. This could be the key to a truly sustainable future.

PREVIEW

Consumer types and characteristics

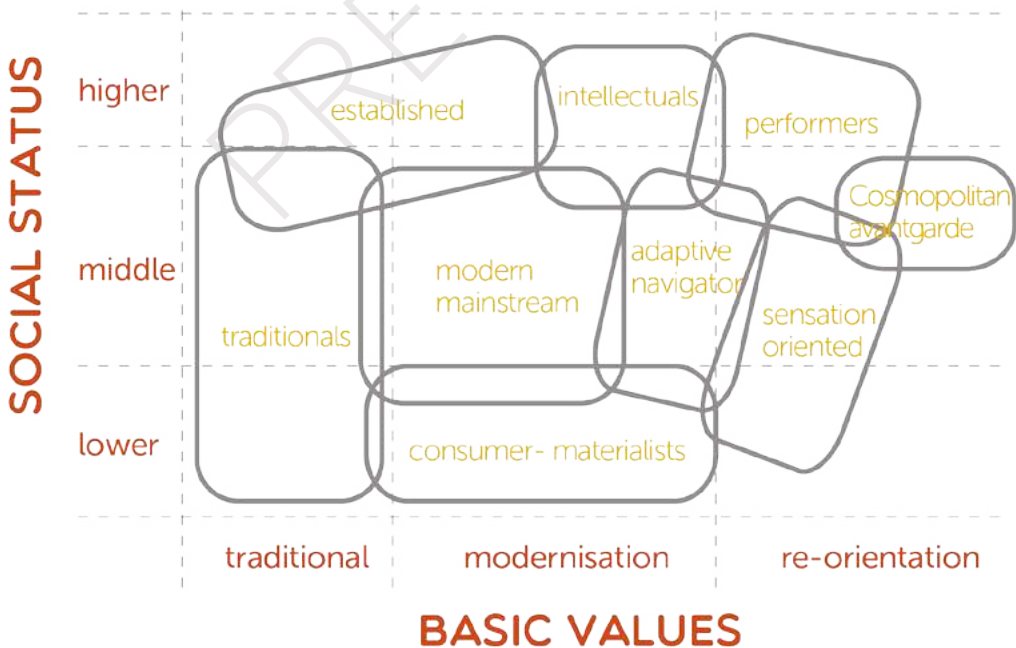
When designing an intervention, product or service, it is important to define the target users (consumers to perform the new behavior), because everyone is in a different life stage, which affects their behavioral and decision-making processes. The Sinus Milieus⁷¹ are presented within a social and target group model that groups people according to their lifestyles and values. It shows the very different proportions of the population represented by each milieu (sections of the population with a similar socio-cultural background). However, the boundaries between the milieus are fluid. There are also areas of contact and transition between the milieus. The two axes for the classification are 1) how traditional their basic values are and 2) the social value, which is measured by the level of education, income and occupational group of its members.

This exemplifies that consumers are clearly not a homogenous group.

Societies are composed of sociocultural diversity with different sensitivities and orientations, values, life goals, lifestyles, attitudes and social backgrounds.

Due to this socio-cultural diversity, people might respond to the same intervention strategy in very different ways. For instance, it may lead some consumers to a behavior change, but this might not be applicable to others.

The explanation for this is that the effect of behavioral determinants (e.g., economic, social, or environmental factors that influence the behavior) varies across individu-

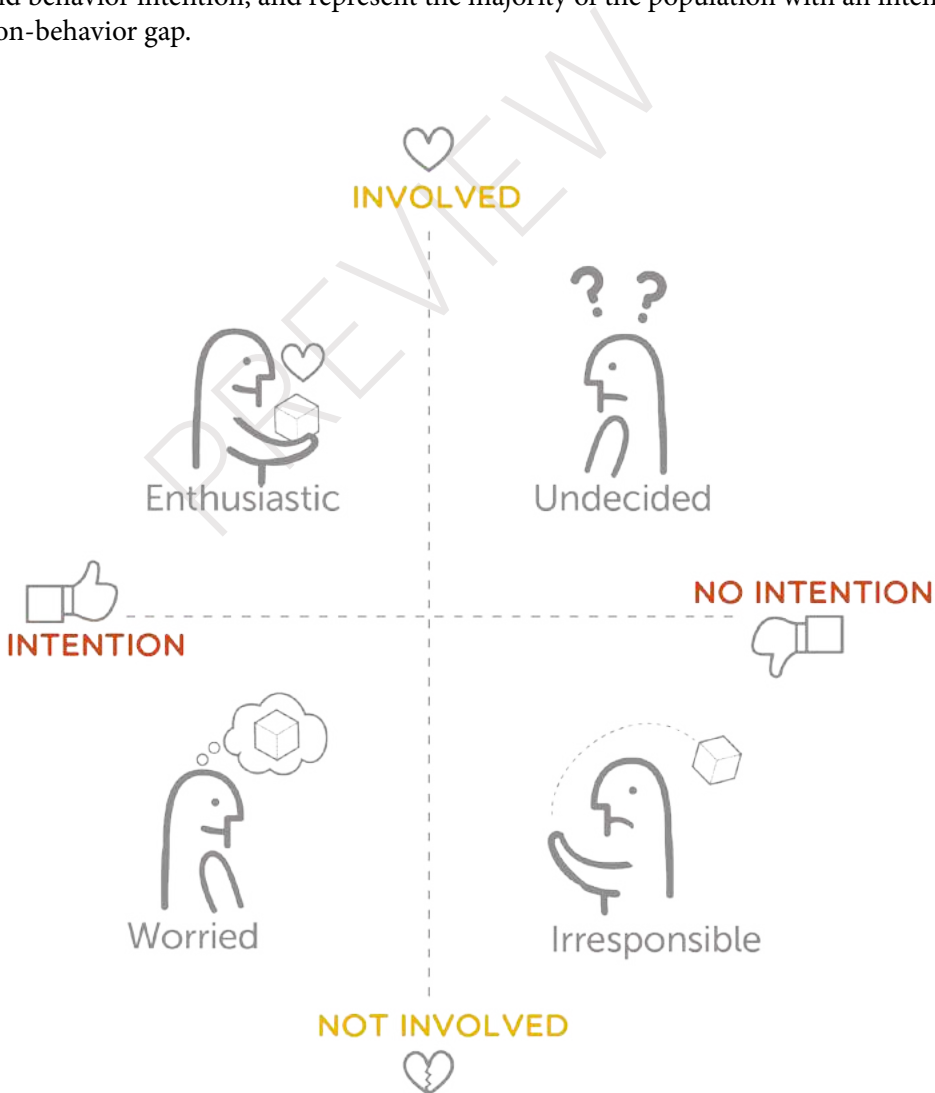


Graphic based on Sinus- Meta Milieus for established markets 2017

als ^{29, 53, 74}. Consequently, when designing sustainable interventions to change consumer behavior, it is indeed crucial to know which behaviors and which behavioral factors should be addressed to achieve this change. Applied to our problem here, this means that in order to create a successful intervention and persuade the target audience to choose pro-environmental behavior, the persuasive systems should be designed according to an in-depth exploration of the target users, generating a direct correspondence with their different needs.

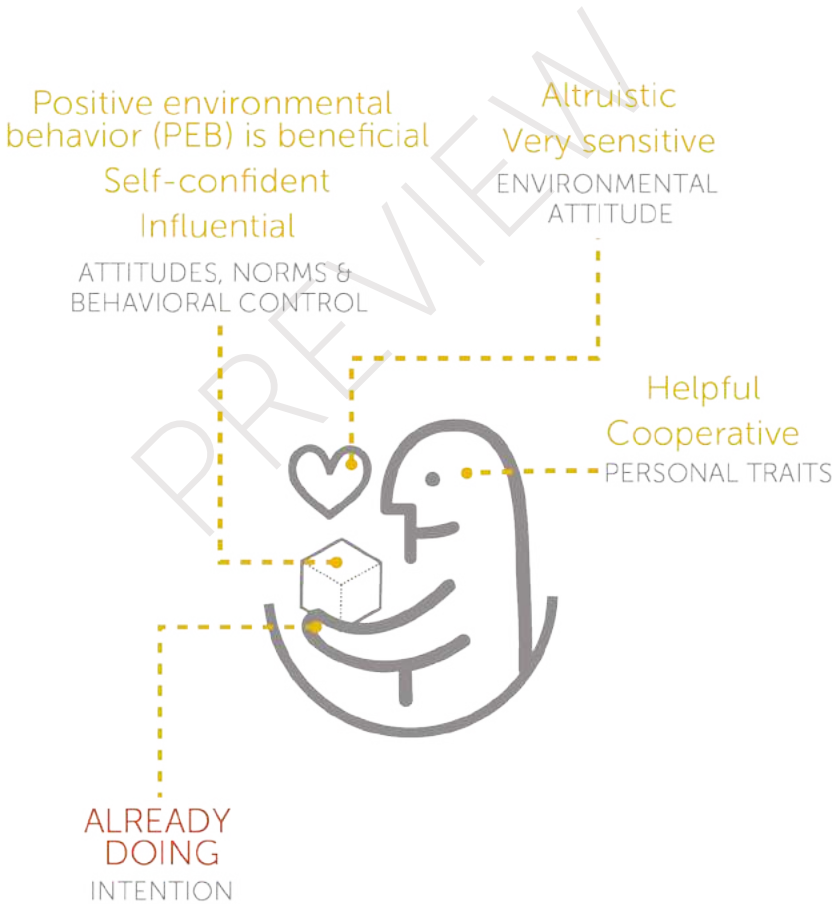
Within a sustainable consumption context, consumers can be classified in clusters based on sustainable consumption acceptance, perception, intention and performance.

The segments can be clustered on two axes: attitude and behavioral intention towards sustainability. As a result, four different consumer types can be proposed ^{99,14}: irresponsible consumers, undecided consumers, worried consumers and enthusiastic consumers. Worried and undecided consumers display conflicting attitudes and behavior intention, and represent the majority of the population with an intention-behavior gap.



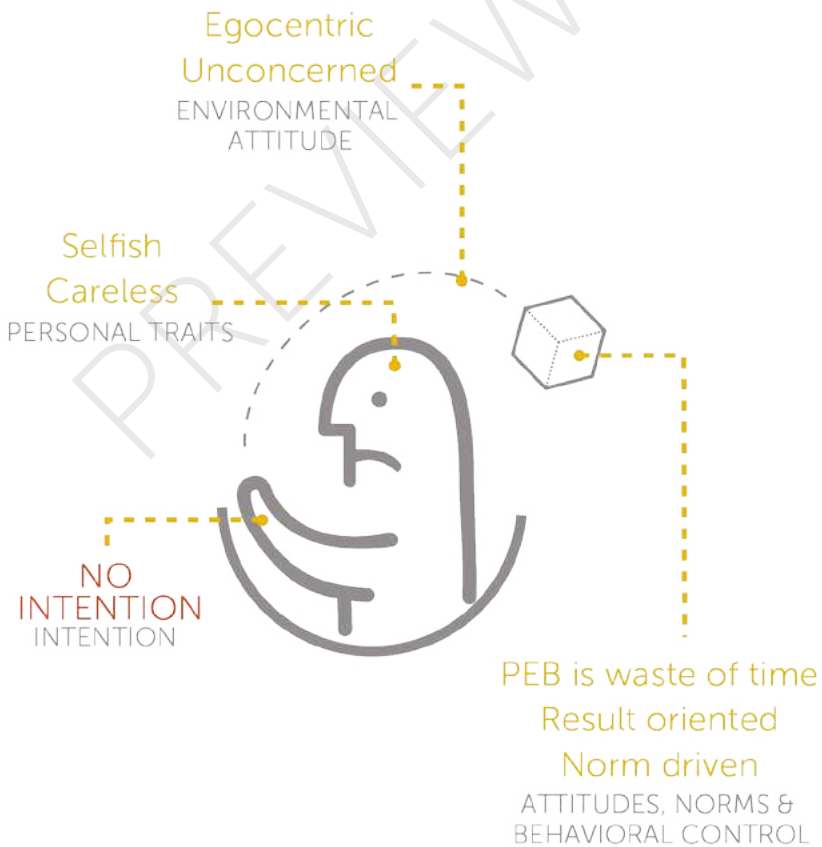
Enthusiastic consumers

Enthusiastic consumers are those of the opinion that it is very positive and meaningful to buy sustainable products and are involved with sustainable consumption. This consumer segment has already performed (and perhaps is still performing) pro-environmental behaviors. They tend to be very sensitive towards environmental topics and issues. These consumers believe that their choices mean a lot for the environment (regarding the importance of performing individual eco-friendly behaviors) and for other people. However, their performance of pro-environmental behaviors may not be repetitive due to motivation that weakens or disappears, or because of the emergence of a new barrier, such as time or money constraints.



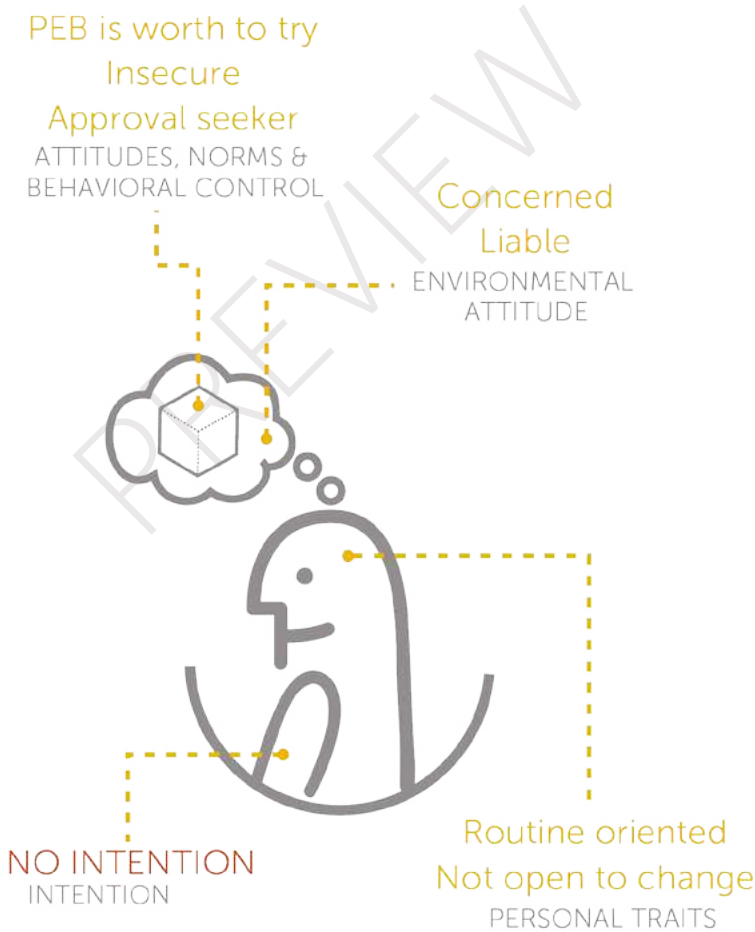
Irresponsible consumers

These are consumers who do not have a positive attitude towards sustainable products nor do they have the intention of buying them, and are therefore less involved with sustainable consumption. Irresponsible consumers tend to be egocentric, have no concern for environmental issues and do not feel responsible for environmental problems. They have a neutral position on the perception of consumer effectiveness. The most effective strategy would be to change these consumers' values from an emphasis on power and authority to striving for a better world, but this long-term goal would be hard to realize.



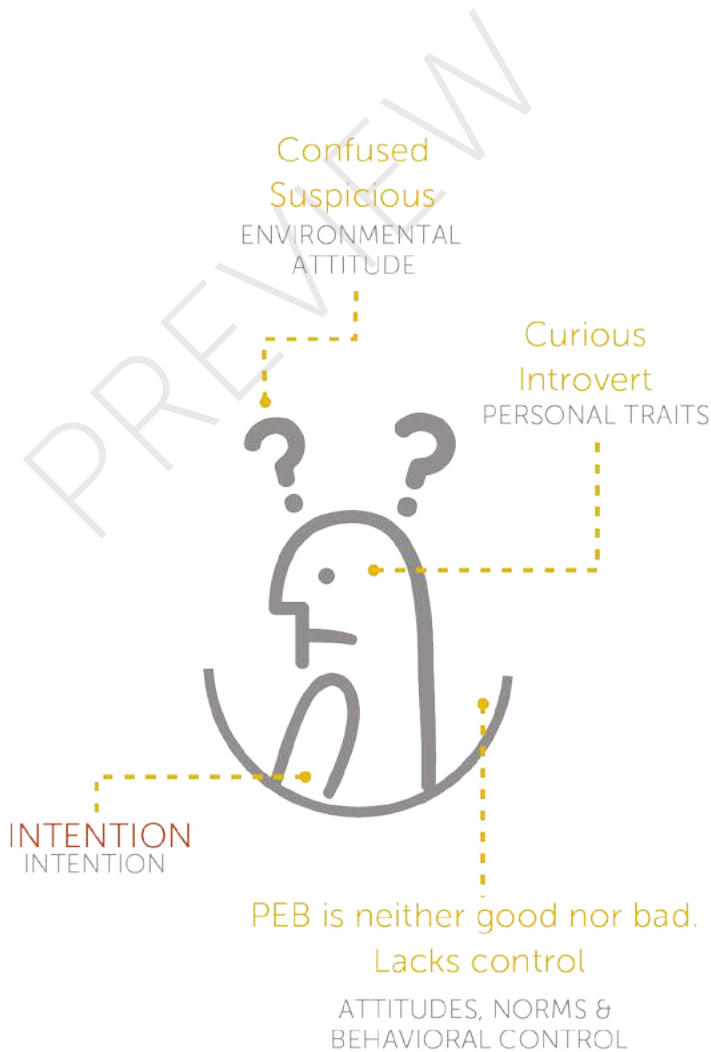
Worried consumers

This segment consists of consumers that have a positive environmental behavior (PEB) and therefore a positive attitude towards sustainable products and generally feel responsible for environmental problems. They are concerned about the well-being of future generations. However, they do not have the intention to perform pro-environmental behaviors for several reasons. First, they are routine-oriented and are not open to change their routines. Second, they might have misbeliefs about sustainable products and services—for example, if they are not available in their neighborhood or surroundings. Finally, they struggle to understand or use these services and products effectively.



Undecided consumers





This segment corresponds to consumers who do not feel positive about sustainable products, but nevertheless claim that it is very likely they will buy these products. This inconsistency can be understood by their belief about social norms. Undecided consumers generally feel responsible for environmental problems, but they appear to be confused about whether their actions can change the situation. Even so, they want to know how to decrease their negative impact on the environment, but are reluctant to act due to the lack of sufficient knowledge and behavioral control. These consumers tend to act because their friends and family find it fairly important that they buy sustainable products.



The four consumer types have different environmental attitudes, personalities, levels of behavioral control and opinions regarding the impact of positive environmental behavior. Consequently, the methods for approaching and reaching them have the most potential when the intervention matches their attitudes and personality, and communicates this through the configuration characteristics.

This categorization is an example of the macro level of consumer types, but lacks an in-depth explanation of specific consumer behaviors, goals and thoughts, which can provide valuable input for designers when planning and designing an intervention. This can be overcome by conducting further research about the particular target consumer.

The ROADMAP section explains in depth how each consumer cluster can be influenced to be more sustainable through different design interventions and facilitator strategies.

	Environmental attitude	Personality traits	Attitudes, norms and behavioral control	Intention
 Enthusiastic	Altruistic Very sensitive	Helpful Cooperative	PEB is beneficial Self-confident Influential	ALREADY DOING
 Irresponsible	Egocentric Unconcerned	Selfish Careless	PEB is a waste of time Result oriented Norm driven	NO
 Worried	Concerned Liable	Routine oriented Not open to change	PEB is worth to try Insecure Approval seeker	YES
 Undecided	Confused Suspicious	Curious Introvert	PEB is neither good nor bad Lacks control	NO

Factors influencing consumer behavior towards sustainability

According to BJ Fogg, every behavior is a product of three elements: motivation, ability and prompts. This means that for a person to perform a behavior, that person must firstly be sufficiently motivated, secondly, they must have the ability to perform it, and finally, they must be prompted to perform the behavior. These three factors must occur at the same moment, or else the behavior will not occur ²⁷.

In most cases, persuasive technologies boost motivation or ability, but this is not enough. The behavior must be prompted in order to be performed.

Motivation

Motivation is a state that energizes, directs and sustains a behavior. It involves goals and requires actions. Goals provide the impulse to make an action and the direction of the action. At the same time, actions require effort in terms of persistence to sustain an activity for a long period of time. Thus, to convince consumers to perform a behavior, motivation is imperative.

According to the Fogg Behavior Model (FBM) ²⁷, there are three core motivator pairs that can be used to boost the motivation to perform a behavior:

1. **Pleasure/Pain:** The result of these motivators is usually immediate, or nearly so. There is little thinking or anticipation involved. People are responding to what is happening in the given moment.
2. **Hope/Fear:** These motivators are characterized by the anticipation of an outcome. Hope is the anticipation of something good happening and fear is the anticipation of something bad, often loss or failure.
3. **Social acceptance/Rejection:** People are motivated to perform certain behaviors in order to be socially accepted. This desire is even more present to avoid being rejected by others. Nowadays, this dimension controls much of our social behavior.

Ability

People need to have the ability required to perform a behavior. Particularly in new behaviors, this could be a decisive point. It determines if the consumer accepts or rejects the opportunity to act.

However, teaching and training consumers to behave differently or in a more complex way demands effort. Consumers tend to be resistant, since it requires time, energy and sometimes money to change their behavior.

Thus, designers should increase the ability of consumers by making a given task easy or easier to accomplish. In other words, to increase the ability relies heavily on the power of simplicity in the product, service or intervention, besides being price

competitive and not scarce. According to Fogg, the success or failure of simplifying depends heavily on a series of six elements. It is important to note that one negatively affected element dramatically increases the chance of failure:

1. **Time:** If a target behavior requires time and the consumer doesn't have time available, then the behavior is not simple to perform.
2. **Money:** For people with limited financial resources, a target behavior that costs money is not suitable to perform.
3. **Physical effort:** Behaviors that require a certain physical effort might not be simple enough to perform.
4. **Brain cycles:** Behavior that requires people to think hard might not be simple. This is especially the case when the mind is focused on other topics.
5. **Social deviance:** This means going against the norm and breaking the rules of society. If a behavior requires one to be socially deviant, that behavior is no longer appropriate to perform.
6. **Non-routine:** People tend to find behaviors simple if they are routine. When people face a behavior that is not routine, they might not want to make that effort.

Prompts

Prompts can also be called triggers, cues, calls to action and so on, but the ideas are all similar. A prompt is something that tells people to perform a behavior at a given moment.

Successful prompts have three characteristics: The prompt is perceived, associated with a target behavior, and both of those happen when the person is motivated and able to perform the behavior.

Prompts can be clustered into three types related to the degree of motivation and ability:

1. **Spark:** The prompt is designed with a motivational element for a person that lacks the motivation to perform a target behavior.
2. **Facilitator:** This makes the behavior easier. This type of prompt is appropriate for users that have high motivation, but lack the ability. The goal of a facilitator is to prompt the behavior, while also making it easier to follow.
3. **Signal:** This prompt indicates or reminds. It works best when people have both the ability and the motivation to act. The signal does not seek to motivate people or simplify the task; it simply works as a reminder.

Additionally, there are other parallel factors that influence sustainable consumer behavior across motivation, ability and prompts. According to Stern⁷⁴, there are four major types of causal variables that affect environmentally significant behavior:

- Attitudinal factors
- External or contextual forces
- Personal capabilities
- Behaviors that occur as habit or routine
-

Rural Afghan girl Vs. NY City girl

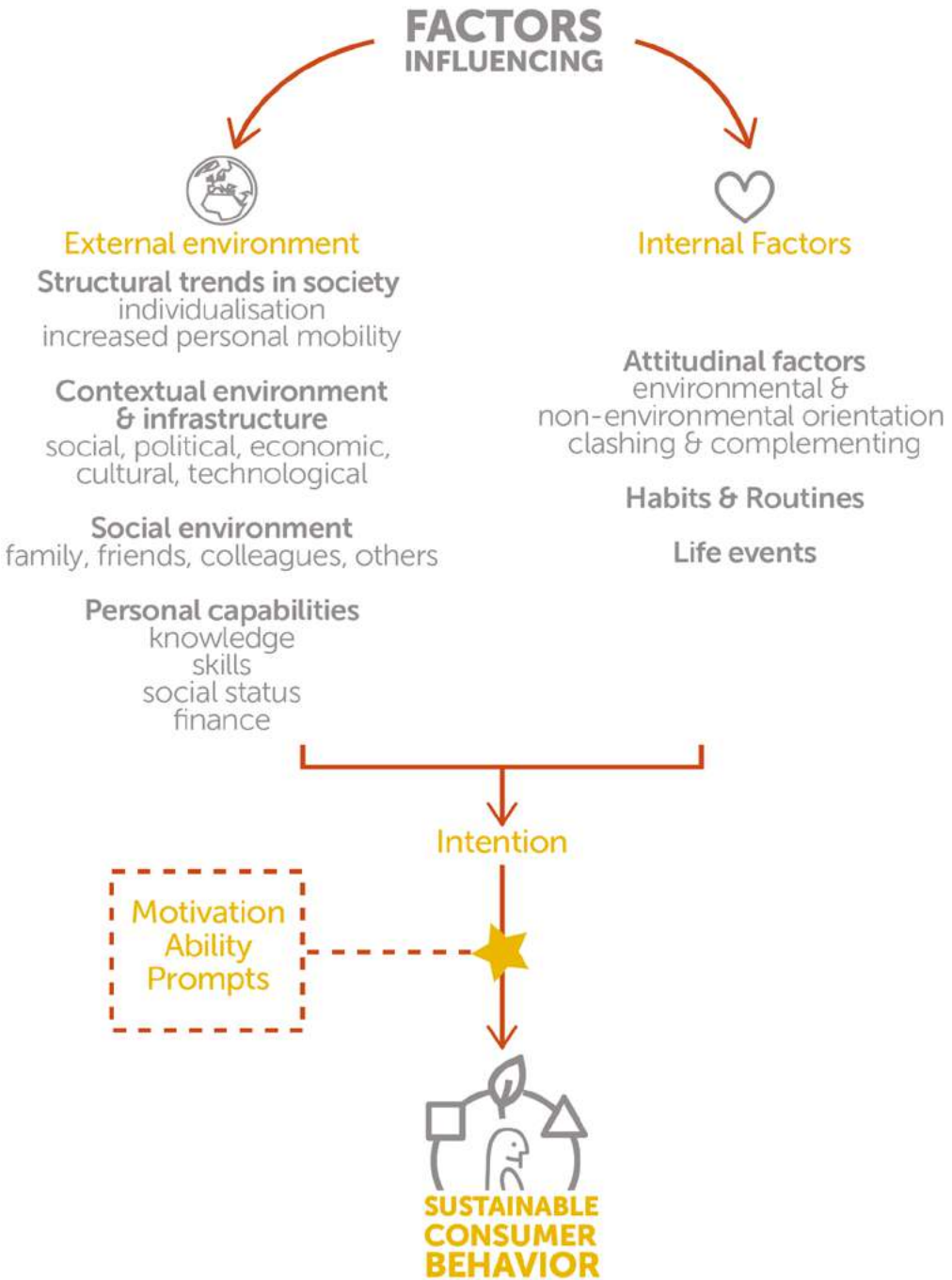
As Lucie Evers, a Dutch marketeer for sustainability and social entrepreneur, once said to me, reaffirming the factors that influence consumer behavior, “Both a teenage girl in the mountains of Afghanistan with an IQ of 136 who only has the Koran as a study book, and a girl of the same age who is born in New York with the same IQ, but whose parents are both lawyers, have different constraints coming from the contextual and social forces, personal capabilities, and routines that will influence and define their behavior and decision-making process at every level.”

This example illustrates that consumer choice is circumscribed by the conditioned variety of forces and constraints in complex social, economic, institutional and technological systems, and consequently, the environmental impact of their choice.

Following the example, the girl from Afghanistan, if willing to make green choices, may find limited options and costs prohibitive due to a lack of relevant products or infrastructure. However, due to the local conditions, it is more likely that the lifestyle in the mountains of Afghanistan is less consumerist and that solutions are adapted to local circumstances and basic needs. Hence, the economy is more locally oriented and, consequently, the environmental impact is relatively low.

In contrast is the case of the girl from New York. Willing to make green choices, she might find information more easily, as well as a variety of options and products, while money would not be a relevant constraint. Nonetheless, as is generally the case in the United States, the lifestyle based on the capitalist economic system and the high amount of petroleum-derived options in the market limits the potential for environmental improvement because of the difficulty of acquiring trustworthy and timely information about the environmental consequences of decisions. Even so, an increasing number of products and services are marketed with claims that they are environmentally benign or beneficial.

Therefore, all these final factors, as well as the motivation, ability and prompts, must be taken into consideration when facing the challenge of designing an intervention that promotes behavioral change. Only this approach can ensure that the behavior is possible and simple to perform by consumers.



STRATEGIES TO DESIGN SUSTAINABLE CONSUMER BEHAVIOR

As stated in earlier chapters, consumers constantly make choices that do not always support their long-term sustainable goals or ethical values (intention-behavior gap). This effect is explained through psychology theories by the fact that our brain works on two different levels: automatic and reflective³⁰.

On the one hand, automatic thinking is very energy effective and bases the judgments on a preset of biases and previous experiences. It happens quickly and without dependence on our awareness to react. This kind of thinking bases the decisions on our subconscious urges and needs. It does not give the right value and rational thinking to long-term goals and ethical values.

Reflective thinking, on the other hand, is based on rational reflections, and uses our cognitive abilities to understand and consider situations before reacting and responding to them.

Automatic thinking is what our brain tends to rely on the most for our daily life, because reflective thinking demands much more energy and attention, and our bodies are biologically wired to save as much energy as possible.

In order to convert their (persuasive) intentions into interventions to promote more sustainable consumer behavior, designers must consider the way the human cognitive system works on these two levels.

Notwithstanding, designers have this ability and can communicate persuasive arguments to users. These intentions can have positive or negative consequences and may affect behavior change both intentionally and unintentionally.

Design for behavior change acknowledges this capacity and responsibility of design-

ers and attempts to facilitate a shift in the everyday choices of the population. DfBC aims to create positive change to close the so-called intention-behavior gap between people's attitudes (which are often pro-environmental) and their everyday behavior.

As stated in earlier chapters, consumers constantly make choices that do not always support their long-term sustainable goals or ethical values (intention-behavior gap). This effect is explained through psychology theories by the fact that our brain works on two different levels: automatic and reflective³⁰.

On the one hand, automatic thinking is very energy effective and bases the judgments on a preset of biases and previous experiences. It happens quickly and without dependence on our awareness to react. This kind of thinking bases the decisions on our subconscious urges and needs. It does not give the right value and rational thinking to long-term goals and ethical values.

Reflective thinking, on the other hand, is based on rational reflections, and uses our cognitive abilities to understand and consider situations before reacting and responding to them.

Automatic thinking is what our brain tends to rely on the most for our daily life, because reflective thinking demands much more energy and attention, and our bodies are biologically wired to save as much energy as possible.

In order to convert their (persuasive) intentions into interventions to promote more sustainable consumer behavior, designers must consider the way the human cognitive system works on these two levels.

Notwithstanding, designers have this ability and can communicate persuasive arguments to users. These intentions can have positive or negative consequences and may affect behavior change both intentionally and unintentionally.

Design for behavior change acknowledges this capacity and responsibility of designers and attempts to facilitate a shift in the everyday choices of the population.

DfBC aims to create positive change to close the so-called intention-behavior gap between people's attitudes (which are often pro-environmental) and their everyday behavior.

Consumer behavior change strategies

The consumer attitude towards an intervention can be changed by making a particular need important. A key aspect in changing attitudes and behaviors is to use the functional approach, the function of mental processes involving consciousness, in utilitarian (utility function of the intervention), ego-defensive (protect themselves and feel secure and safe about the intervention), value-expressive (expression or reflection of the consumer's general values) and knowledge functions (knowing more about the intervention)⁷⁰.

Furthermore, another key aspect is the importance for consumers to see that the desired behavior and attitude towards the intervention is really not in conflict with another personal behavior or belief. This can sometimes resolve actual or potential conflicts between two attitudes and may be induced to change their evaluation of the attitude and perform the desired behavior.

Based on the factors that influence consumer behavior and the two levels of the human cognitive system, consumption patterns can be altered with the application of strategies embedded in the intervention. Two of them are illustrated below. They can be used to reinforce the two key aspects mentioned before and ensure consumer behavior change.

NUDGING

The term 'nudge' means a gentle push or touch. The Nudge Method attempts to do exactly that: to gently push people in a preferable direction. Nudging, as a method, aims to create predictable behavioral outcomes based on how the human brain perceives the world and makes decisions. Thaler and Sunstein⁸² set the original definition of nudging as "any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives."

Using nudging strategies, policy makers and industries have the opportunity to alter the behavior of people in ways that simultaneously benefit both the user and society as a whole.

Designers acting as mediators of the touch points between the interventions and the consumers can engrave implicit nudges in the design to affect consumer behavior in both automatic and reflective ways, and to also understand the reasoning behind how the choices are made.

Cass R. Sunstein¹² compiled a list of various nudge techniques and some simple examples:

- **Default rules:** Nudges that automatically enroll people in the action, like setting people in a specific program, such as default double-sided printing in university printers. Default rules may be the most effective nudges and can promote environmental protection. They are indispensable, especially when it is too burdensome and time-consuming for people to choose.

- **Simplification:** Simplifies information in order to facilitate and avoid misunderstandings and make complex inferences more intuitive. In both rich and poor countries, complexity is a serious problem because it causes confusion, increases costs, and deters participation in important actions. As a general rule, interventions should be easy to follow or even intuitive.
- **Use of social norms:** Emphasizing what most people are doing is an effective nudge to engage people in a certain behavior (e.g., “most of your coworkers are doing car-sharing” or “nine out of ten hotel guests reuse their towels”). It is indeed effective to inform people that others are engaged in a certain behavior. Such information is often most powerful when it is as local and specific as possible (e.g., “the overwhelming majority of people in your community have reduced their car use by fifty percent”).
- **Increase in ease and convenience:** This type of nudge aims to make things easy. For instance, making organic and local food more visible in supermarkets will increase the possibility of it being picked. People often make the easy choice, thus reducing various barriers (including the time it takes to understand what to do) is often helpful. A supplemental point: If the easy choice is also fun, people are more likely to make it.
- **Disclosure:** Make information accessible; for example: by demonstrating the positive or neutral environmental impact of sustainable and fair clothing on their labels and in their marketing strategies. Disclosure nudges can be highly effective, particularly if the information is both comprehensible and accessible. Simplicity is exceedingly important (e.g., “More detailed and fuller disclosure might be made available online for those who are interested in it”).
- **Warnings, graphics or otherwise:** Nudges can also be more explicit in describing the risks of some behavior, like the warnings found on cigarette packaging. If serious risks are involved, the best nudge might be a warning. A central point is that attention is a scarce resource, and warnings are attentive to that fact. Research also shows that people are far less likely to discount a warning when it is accompanied by a description of the concrete steps that people can take to reduce the relevant risk (e.g., “You can do X and Y to lower your risk”).
- **Pre-commitment strategies:** To encourage people to engage in a specific course of action to reach their goals. People often have certain objectives, like supporting animal activism and not consuming animal-based products. However, their behavior falls short of those goals. If people pre-commit to engage in a certain action, such as signing a petition for animal cruelty-free products and reminding them of their decision, they are more likely to act in accordance with their goals. Notably, committing to a specific action at a precise future moment in time motivates action and reduces procrastination.

- **Reminders:** To avoid procrastination or forgetfulness, a reminder can have a significant impact. People can be nudged by being alerted of their upcoming obligations or commitments, such as by email or text message. With reminders, timing greatly matters; making sure that people can act immediately on the information is critical (especially in light of the occasional tendency towards forgetfulness).
- **Eliciting implementation intentions:** When asked about their intention to engage in a certain activity, people are more likely to do so (e.g., “Do you really want to use a plastic straw?”).

THE BEHAVIOR WIZARD

Fogg and his Stanford team created a tool called the Behavior Wizard. It categorizes behaviors into 15 types ²⁷. The tool is composed of a grid formed by the horizontal axis as a dimension called the ‘behavior flavor’ (five flavors) and the vertical axis, which maps out the ‘duration’ (three durations).

Behavior Flavors

- **Green (non-familiar/new behavior)** is a type of behavior that is new to the target audience. To design an intervention to achieve a Green Behavior requires special consideration. This may include making the behavior simpler, reducing anxiety, connecting the new behavior to existing practices, providing social support, etc.
- **Blue (familiar behavior)** is a behavior that the target audience is already familiar with. For example, having breakfast is a Blue Behavior for most people. To achieve these behaviors, designers can draw on past experiences. Over time, a Green Behavior turns into a Blue Behavior as a person becomes more familiar with it.
- **Purple (increase behavior)** is the increased performance of a familiar behavior. These behaviors are already performed and the aim is to increase them in some way, such as performing the behavior for longer, more intensely, or with more effort.
- **Gray (decrease behavior)** designates a decrease in the performance of a familiar behavior. The behavior can decrease in intensity, duration, or frequency, such as using fewer palm oil products, consuming less energy at home, or buying fewer plastic products.
- **Black (stop behavior)** designates the cessation of an existing behavior. For example, ceasing to eat meat is a black behavior.

Fogg Behavior Grid

behaviorgrid.org

	 Dot is done <u>one-time</u>	 Span has <u>specific duration</u> such as 40 days	 Path is done from now on, a <u>permanent change</u>
Green Do <u>new</u> behavior, one that is <u>unfamiliar</u>	 Green Dot Do new behavior, one time <i>Instal solar panels at home</i>	 Green Span Do new behavior, for a period of time <i>Carpool to work for three weeks</i>	 Green Path Do new behavior from now on <i>Start growing own vegetables</i>
Blue Do <u>familiar</u> behavior	 Blue Dot Do familiar behavior one time <i>Plant a tree</i>	 Blue Span Do familiar behavior for a period of time <i>Bike to work for two months</i>	 Blue Path Do familiar behavior from now on <i>Turn off light when leaving the room</i>
Purple <u>Increase</u> behavior intensity or duration	 Purple Dot Increase behavior one time <i>Buy today more vegetables than meat</i>	 Purple Span Increase behavior for a period of time <i>Use more public bus for one month</i>	 Purple Path Increase behavior from now on <i>Purchase more local products</i>
Gray <u>Decrease</u> behavior intensity or duration	 Gray Dot Decrease behavior one time <i>Use less detergent for the laundry today</i>	 Gray Span Decrease behavior for a period of time <i>Take shorter showers this week</i>	 Gray Path Decrease behavior from now on <i>Eat less palm oil products from now on</i>
Black <u>Stop</u> doing a behavior	 Black Dot Stop a behavior one time <i>Turn off the heater tonight</i>	 Black Span Stop a behavior for a period of time <i>Don't water lawn during spring</i>	 Black Path Stop a behavior from now on <i>Never eat meat again, become vegetarian</i>

Graphic based on Fogg, BJ. BEHAVIOR GRID
www.behaviorwizard.org

Durations of Behaviors

- **Dot Behavior** is a behavior that is done only once.
- **Span Behavior** is a behavior that is done over a period of time. For example, you could substitute rice for quinoa for one month. Designing Span Behaviors requires special consideration, as people must stick to a pattern of action for a certain period of time. Thus, a Span intervention may need regular prompts.
- **Path Behavior** is a behavior that is done from now on for the foreseeable future. This is a permanent change. For example, becoming a permanent vegetarian is an example of this behavior. Path Behaviors may be the hardest types of behaviors to induce. Due to their permanent nature, they require a significant and lasting shift in a person's identity or lifestyle. In many cases, the target behavior must be prompted regularly enough to the point that the behavior becomes a habit, part of a person's routine or a reflexive response.

Each of these 15 behavior types requires different psychological strategies and persuasive techniques to reach the targeted behavior.

In the next section, ROADMAP, the strategies for each of them will be explained in depth.

Sustainable design strategies

The term sustainable design has been used in multiple disciplines and refers to a design process that integrates an environmentally-friendly approach that considers natural resources as an essential part of the design.

Sustainable design acts as a philosophy to achieve a better future for the human race through the wise and reduced consumption of Earth's resources.

This approach is applied by different companies, governmental entities, and non-governmental organizations. Companies and governments with leading design strategies have more of a potential to apply sustainable design.

Design with a holistic approach in companies and organizations can unlock capabilities to consider sustainable solutions. This can replace old structures in existing products and services or lead to envisioning new capabilities in the new development process, creating an enormous opportunity to innovate sustainable and prosperous growth to not only produce less harm, but also to ameliorate the social, environmental, and economic conditions.

The results can be astoundingly positive and enriching for the business, the community, consumers and the environment. As stated by Chapman and Gant ¹³, "Design is a needed, necessary and valuable process of invention and innovation, with the potential to take us closer to a sustainable society."

Designing sustainably requires the ability to think 'upstream.' This means not thinking only of how to reduce the negative impact at the end of the process and the end of the life cycle (setting the filters at the end of the pipelines), but to have the filters in our heads to begin with and design the entire process sustainably. It is easier to control the output this way, rather than trying to fix critical points in a fixed and unsustainable chain.

There are certain strategies to optimize the production and/or consumption structure to make more sustainable interventions. Some sustainable design principles, pointed out by Hans van Weenen ⁹⁵, which match with the goal of optimizing sustainable consumption will be explained on the following pages.

WASTE PREVENTION

The concept of waste prevention has a broader focus than exclusively pollution prevention and waste reduction activities primarily from production processes. The prevention of waste generation is defined by J.C. van Weenen as ⁹⁶:

“Activities in production, which consist of:

- Substitution and reduction of the use of raw materials;
- Change of the performance of existing products and processes;
- Change of the design of new products and processes.

These activities must result in the non-generation or the reduction of waste and/or its pollution potential, in the materials life cycle.”

SOURCE REDUCTION

Source reduction refers to practices that reduce the use or generation of insecure or hazardous substances prior to recycling, treatment or control ³⁷. The focus of source reduction is clearly on those substances that, due to their quantity, volume or composition, result in problems at the end of their life cycles.

INTEGRAL CHAIN CONTROL

The strategy requires performing an integral life cycle assessment of the environmental impact of a product or service from the initial extraction and processing of raw materials to final disposal or upcycling.

Having integral chain management as a policy principle requires producers and consumers to participate. Both must take into account all the effects on the environment that emerge at any point on the chains of substance flow and look forward and backwards through those chains. Producers and consumers should be aware of the impact of their actions on the environment at any point in the chain, which will help to develop possible improvements and establish the limits of environmental capacity.

An example of this is the realization of cycling processes for substances, materials, components and products to keep a constant flow in those cycles for as long as possible, as well as for the programmed long life of products, as this flow promotes and facilitates the dematerialization process.

The United Nations Environmental Program ⁹³ defines dematerialization as “[...] decreasing the material requirements of whole economies. It requires (a) reducing the material intensity of products and services, i.e., by increasing material efficiency, and (b) especially reducing the use of primary material resources (such as ores, coal, minerals, metals, etc.) by improving recycling and the reuse of secondary materials (i.e., shifting to a circular economy).”

ECO-CYCLE SOCIETY

An eco-cycle society is intended to establish the cyclic management of goods and production, with an emphasis on reuse and reclamation. It aims to realize the most efficient use of resources and to reduce the amount of waste produced at the consumer level in the moment of use, in contrast to the other two strategies, which focus on the production phase.

A circular economy has been implemented in many countries and aims to maximize the use of products that are produced from renewable resources. The goal is to reduce resource input and waste, emission, and energy leakage by minimizing, slowing, closing and narrowing material and energy loops.

Following the same principle, William McDonough⁵², in his book *Cradle to Cradle*, indicates that there are two types of metabolism on the planet. There is the biological metabolism (biosphere), which are the cycles of nature, and the technical metabolism (technosphere), namely the cycles of industry.

McDonough and the 'cradle to cradle' approach suggest that the industry must produce goods in a way that all products and materials should be biodegradable and become food for biological cycles, or they should be made of technical materials that remain in closed-loop technical cycles where they continually circulate as valuable nutrients for the industry.

Narodoslawsky, M.⁵⁶ had a similar opinion that non-durable products should be based on renewable resources. He points out that resources that pass through the so-called 'bio-cycle' (in which resources are built from substances of the biosphere) serve for short-life products. In contrast, materials originating from non-renewable resources should be fed into the 'mineral cycle' and be used for durable products.

The principal streams for this are technical construction flows and reuse flows. Mineral substances must be used for as long as possible.

In other words, these two principles suggest that non-reusable sources should be used for long-life design products and should not end as waste in a short period of time. At the end of the use phase, they should return to technical cycles by recycling or upcycling the material.

On the contrary, short-life products should be made from renewable resources and returned to biological cycles at the end of the use phase as food or nutrients.

Additionally, Tang and Bhamra ^{81,4} examined literature that provides an understanding of the psychological and behavioral factors of behavioral change. They identified strategies of Design for Sustainable Behavior (DfSB) that can be applied within a design context to influence user behavior in the direction of a reduction of negative social or environmental use impacts.

The strategies, extracted from the work of Bhamra et al. ⁵, explain their aim, indicate how they work, and illustrate with examples where they have been applied.

The design interventions are classified by the degree of power in decision-making between the user and the product or service. The seven design approaches fall into three levels of interventions. On the one side is when the power of decision-making lies completely on the user, so the intervention aims to guide the change. The other side is where the power in decision-making derives solely from the intervention and the change must be forced.

This variety of strategies either guide, maintain or ensure the change towards sustainable consumer behavior.

ECO- INFORMATION- EDUCATION

This strategy aims to make consumables visible, understandable and accessible to inspire consumers to reflect upon their use of resources. It works by making the product express the presence and consumption of resources, e.g., water, energy, etc. At the same time, the product encourages the consumer to interact with the resources being used.

Power Aware Cord (Interactive Institute, 2004)

The Power-Aware Cord embeds wires around a cable that pulse light in relation to how much electricity is being drawn on the grid. The more current there is, the blue light spirals brighter and faster. Making the invisible visible tuned consumers in to their bad habits, nudging them to power down and offering some surprising appliance insights: when a radio broadcasts drumbeats and bass riffs, its electricity consumption jumps.

ECO-CHOICE – EMPOWERMENT

With this strategy, consumers are given options to encourage them to think about their behavior and take responsibility for their actions. This works by users having a choice and the product enabling sustainable use to occur.

Efergy eGO Wi-Fi Socket

This appliance is a socket that uses an app to program appliances remotely (turn

on and off). The device eliminates the stand-by power of your appliances, and helps to save energy and, consequently, money.

ECO-FEEDBACK – LINKS TO ENVIRONMENTALLY OR SOCIALLY RESPONSIBLE ACTION

Eco-feedback strategies inform users about what they are doing and encourage consumers to make environmentally and socially responsible decisions by offering real-time feedback.

The success of the strategy is that the product provides tangible aural, visual or tactile signs as reminders to inform users of resource use.

Wattson energy monitor

It measures in real time the amount of electricity being used and generated at home or at the office. It shows the values on an easy-to-read display in both numbers and colors. It is complemented by Wattson Anywhere, the online portal to access the usage and generation data from any Internet-enabled device. For users with renewable energy, it is particularly interesting to see how much of the generated electricity is used at home and to monitor the performance of the renewable system.

ECO-SPUR – REWARDS AND PENALTIES INCENTIVES

The strategy is to inspire users to explore more sustainable usage by providing rewards to prompt good behavior or penalties to ‘punish’ unsustainable usage. The product should show the user the consequences of their actions through ‘rewarding incentives’ and ‘penalties.’

GreenApes- sustainable lifestyle app

GreenApes is a digital platform for sustainability engagement. It engages people (citizens, customers, employees) in sustainable lifestyles via social networking and gamification. It gives real-life rewards (discount bonus, free gifts, etc.) to users when they perform sustainable actions.

ECO-STEER – AFFORDANCES AND CONSTRAINTS

This facilitates users to adopt more environmentally or socially desirable use habits through the prescriptions and/or constraints of use embedded in the design of the intervention.

This means that the intervention contains affordances and constraints that encourage users to adopt more sustainable use habits or reform their existing unsustainable habits.

Ecover -bio laundry tablets

The tablets provided can counteract excessive amounts of washing powder consumption by prescribing the correct dose.

ECO-TECHNICAL INTERVENTION

With the combination of design and advanced technology, the aim is to restrain existing use habits and to persuade or control user behavior automatically. The intervention utilizes advanced technology to persuade or control user behavior automatically.

Energy Curtain—Interacting with Daily Light Cycles

During the day, the shade can be drawn to the extent that people choose to collect sunlight and, during the evening, the collected energy is expressed as a glowing pattern on the inside of the shade.

CLEVER DESIGN

Through purely innovative product design, some consumers automatically act environmentally or socially conscious without raising awareness or changing their behavior. The design solution decreases the environmental impact without changing the user's behavior.

Orbital Systems-Purifying and recycling shower

This is an integrated shower system that purifies and recycles the water by Space Certified Technology, enabling up to 90% savings of water and energy. During every shower, it uses the same water in a loop.

SCALES

SCALES is an integrative set of design principles developed by the DEEDS project⁸ (DEsign EDucation and Sustainability) funded by the European Union's Leonardo da Vinci Programme in 2006-2008. It helps designers meet the challenge of designing for sustainability, working at the interface between sustainable production and consumption. It promotes a change of the trajectory of production and consumption patterns.

The principles were published on the DEEDS website, www.deedsproject.org. In 2009, an early overview was published in the International Journal of Innovation and Sustainable Development.

SCALES is a set of 24 mutually complementary principles related to design for sustainability and design for the environment that set comprehensive criteria in different themes:

Special Skills

Holistic approach

- S1 – Develop new skills for recognizing, framing (looking for systemic connections) and solving problems.
- S2 – Define problems holistically by systems and Life Cycle Thinking (LCT), combined with appropriate technical and social innovation.
- S3 – Analyze problems from multiple perspectives, including the four sustainability dimensions – economic, human/social, societal/institutional, and environmental – including the full richness of the human dimension (mental, physical, emotional and spiritual).

Eco-efficient production and resource usage

- S4 – Develop Life Cycle Thinking (LCT), and Life Cycle Assessment (LCA) and 'cradle to cradle' skills, be familiar with technology know-how and the appropriate application of lightweighting (materials reduction), renewables/new materials, extended product lives, reusability and recyclability (designing 'quality waste'), waste avoidance, energy issues and dematerialization (moving from products to dematerialized services).
- S5 – Integrate efficient service provision by designing product-service systems (PSS), products suitable for sharing and pooling, pay-per-use or pay-per-experience options.
- S6 – Maximize consumer satisfaction per service enjoyed by addressing human needs: consider different material and immaterial options to do this and choose the most sustainable one; design fertile products offering users an experience, emotion, relation, pride, self-esteem and awareness.

Communication and leadership

- S7 – Lead the agenda - develop leadership skills.
- S8 – Tell engaging stories - develop presentation, narrative, and scenario-setting

skills.

- S9 – Forge new versions of enterprise - understand economic thinking without adopting it (know the language, but don't adopt the mindset of business).

Creating change agents

- C1 – Expand your context - be aware that the sustainability context expands the design context in both thinking and practice.
- C2 – Change perceptions - by making use of the diversity of 'value-added' outcomes of DfS.
- C3 – Set new aspirations - practice DfS approaches that provide significant, immediate and visible benefits to encourage consumers to aspire to a new and sustainable cultural representation of the 'good life'.

Awareness

Systemic and context

- A1 – Be aware of context and connections (people, planet, prosperity: key drivers and timeframes).
- A2 – Be aware of positive and negative impacts, feedback loops and side effects in this context.
- A3 – Be aware of choice and responsibility under these circumstances.

Learning together

- L1 – Seek to work with other disciplines; practice inter- and transdisciplinary thinking and practices.
- L2 – Be a teacher-learner; practice mutual learning, creativity and team working to understand sharing ideas as a way to stimulate creativity.
- L3 – Participate with your peers; practice teaching and learning through participation, involving an extended peer community of relevant stakeholders.

Ethical responsibilities

- E1 – Develop designs that do no harm (responsible design, with integrity), but contribute to a sustainable approach to a 'good life', over the long term and globally, and also if applied in mass production.
- E2 – Create genuine consumer empowerment; offer designs that enhance personal standing and acceptance, and thus social sustainability, and encourage user involvement (consumer empowerment).
- E3 – Focus on experiences, not objects; develop practical, functional, and fun designs that deepen life experiences and strengthen personal and social cohesion.

Synergy and co-creating

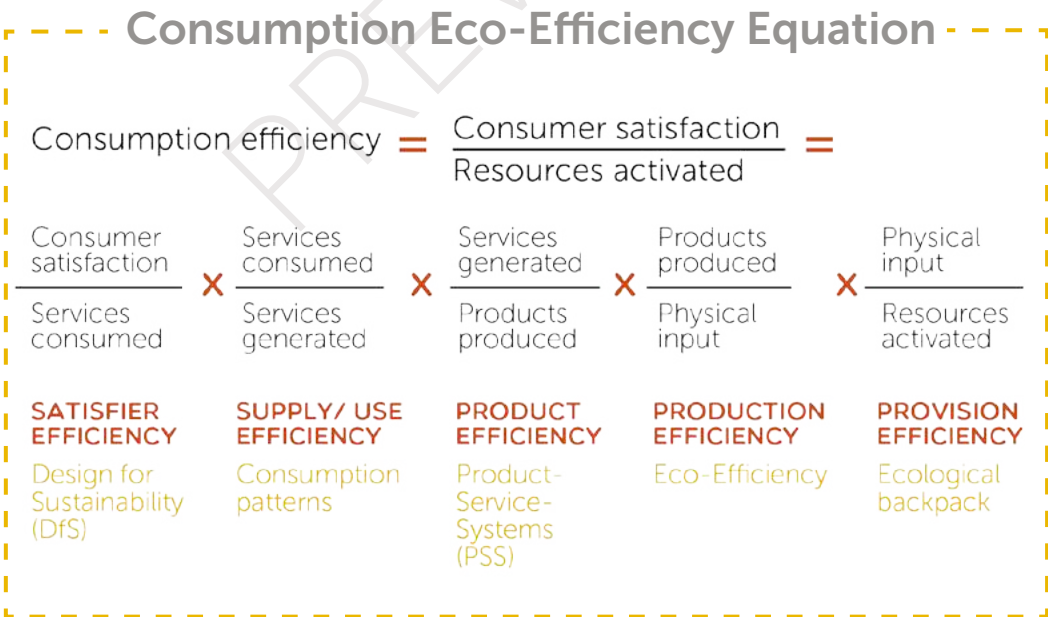
- S1 – Activate through participation; promote the development of teams, communities and networks.
- S2 – Engage in synergistic clusters of competence.
- S3 – Practice collaboration, sharing and partnering, and involve stakeholders in the problem definition and solution design process.

ECO-EFFICIENCY AND ECO-EFFECTIVENESS OF PRODUCTION AND CONSUMPTION

It is not a hidden truth that for the industry, in the economic dimension of production, profitability is the main motive that drives the production system, rather than the desire to satisfy human needs. Nonetheless, production innovation is the most understood and widely used strategy for a transition towards sustainability. Moreover, other stages of the chain must be evaluated for a broader, more sustainable transition.

Eco-efficiency and eco-effectiveness are metrics that consider aspects (efficiency, effectiveness, durability and the convenient fulfillment of functional and symbolic needs and wants) of the whole production and consumption chain translated into the satisfaction of users at minimum costs and with the lowest negative impact. On the one hand, eco-efficiency is the improved environmental performance of a product through the selection of low-impact materials, the reduction of material usage, reduced energy consumption, and reduced waste and pollution per functional unit of a product during its life cycle^{77, 52}.

Applied to consumption, eco-efficiency can be defined as the ratio between consumer satisfaction and the activated resources to achieve it. The goal is to maximize satisfaction with the lowest possible use of resources.



Graphic based on Spangenberg, J.H.

On the other hand, eco-effectiveness means improving the total impact on the environment when consumer needs are satisfied not only by the function in question, but also by additional fulfillments around it.

The concept of eco-effectiveness proposes the transformation of products and their associated material flows, such that they form a supportive relationship with ecological systems and future economic growth. The goal is not to minimize the cradle to grave flow of materials, but to generate cyclical, cradle to cradle metabolisms that enable materials to maintain their status as resources over time (upcycling).

Consequently, eco-effectiveness may be seen as doing the right thing in long-term planning. Eco-efficiency may instead be understood as doing things right in a short-term performance. Therefore, it is indeed necessary to address these long- and short-term assessments simultaneously.

Fluorescent lamps.

Eco-effectiveness VS. Eco-efficiency

An example of the difference between eco-effectiveness and eco-efficiency and the crucial correlation between them are fluorescent lighting systems. They spread rapidly during World War II, and by 1951, more light was produced in the United States by fluorescent lamps than by incandescent lamps. Fluorescent bulbs were supposed to be the invention of the century, as they are more energy-efficient and burn less energy in comparison to conventional light bulbs. However, these compact fluorescent light bulbs contain mercury, which is highly toxic and particularly harmful to the brain of both fetuses and children. This aspect is highly problematic, especially when a bulb breaks. With the fluorescent light bulb, one problem was solved, but another was created. The solution is energy-efficient, but the bulbs are made from toxic substances. It is far from being an effective solution to clean power.

Another more recent case in the mobility sector is the emerging car-sharing business model in Germany. On average, a privately owned car is used less than 60 minutes per day, representing 4% of the time, while the other 96% of the time it is parked⁶⁵. This leads to an accumulated use time of less than six months over 12 years of the product's life. Seen this way, to own and drive a car is not very eco-efficient and it is easy to detect possibilities for improvement in the use phase socio-culturally, rather than technically. For instance, there can be an improvement of the use intensity by sharing instead of owning.

This was proven in the case of DriveNow. The floating car-sharing service improves city mobility and increases the promotion of local mobility in urban areas. Cars are picked up and dropped off anywhere in the city. The service is a joint venture between BMW and the car rental company Sixt. According to BMW's company surveys⁶⁷, 38% of DriveNow customers have sold a personal vehicle as a result of using the car-sharing service. It sounds like a highly efficient service, but in the

entire life cycle of the service and products involved, it fails to develop aspects that are both eco-effective and eco-efficient. For instance, when it comes to the type of energy used by the cars, all of them should be electric, not petroleum fuel or diesel cars. Similarly, it can be questioned whether the cars are developed, designed and built in a way that the materials and parts can return to a technical cycle and be disassembled, dismantled, recycled and upcycled or to a biological cycle and be compostable.

However, the shift of car-use behavior achieved by DriveNow is part of a recent global trend. Today's shift from ownership to access is a visible trend that is gaining power every day and will be a major economic driver in the future. It changes the medieval paradigm of the relation between the terms wealth and ownership. One of the principles of a circular economy is to offer products as services, instead of conventionally selling products. The products are taken by the customers and they pay for the time or usage, for either a short or long contract period, like the case of DriveNow and many other shared mobility services.

PREVIEW

This section has introduced a range of different concepts, definitions and strategies that can be used to support design for sustainable consumption in the different stages of the product or service development process. These are just a few of the many ideas that can be found in literature. Through a quick web search, one can find many more. However, I consider the selection presented in this book to be especially relevant to designers. The combination of information, inspiration, education, exemplification and guidance makes designers more involved and committed to a sustainable future and enables them to contribute by designing products and services to change consumer behavior and promote sustainable production and consumption.

Both consumer behavior change strategies and sustainable design strategies, like the nudging techniques and the behavior wizard, as well as the scales and sustainable design principles, and design interventions should be implemented to reach a sustainable level in the interventions. These sustainable consumption and production strategies, applied to increase innovation, use low-impact materials, optimize processes and manufacturing, make distribution more efficient, reduce the impact of use and optimize the life cycle, should aim to make consumers have more sustainable consumption habits.

The strategies presented above can be combined and used on a mix-and-match basis. The next section presents the tool that I developed based on these strategies and concepts to make a roadmap to help designers apply them in the design process from start to finish.

ROADMAP

*Sustainable consumer behavior
+ Sustainable design strategies + User types
+ Service and product design*

This section describes my proposed tool in detail. The roadmap assists designers in the design process to produce sustainable and innovative solutions to change consumer behavior towards a more sustainable lifestyle and consumption.

The tool combines best practices, theories, concepts and strategies from the BASICS section. The integration of the framework from different disciplines (consumer behavior, service design, sustainable design, psychology and design for behavior change) gives a holistic and complete approach to apply in the design process. The contribution and relevance of the tool is the merging of various elements in a sustainable consumer-centric way to enhance the probability of having more sustainable outcomes.

This tool should be used as a systemic guidance map or toolbox to place sustainability at the center of the design process from idea generation, through implementation, up to the creation of new solutions for complex consumption-related challenges. However, it is not a rigorous step-by-step manual detailing how a design project should be conducted.

The roadmap consist of six stages: 1) defining the desired behavior and target consumer type, 2) understanding the psychology of consumers, 3) selecting the most suitable design intervention type, 4) choosing the facilitator strategies to take action implicit in the intervention, 5) generating the idea and concept (compilation of design properties) and finally 6) evaluating or assessing the process to learn and improve.

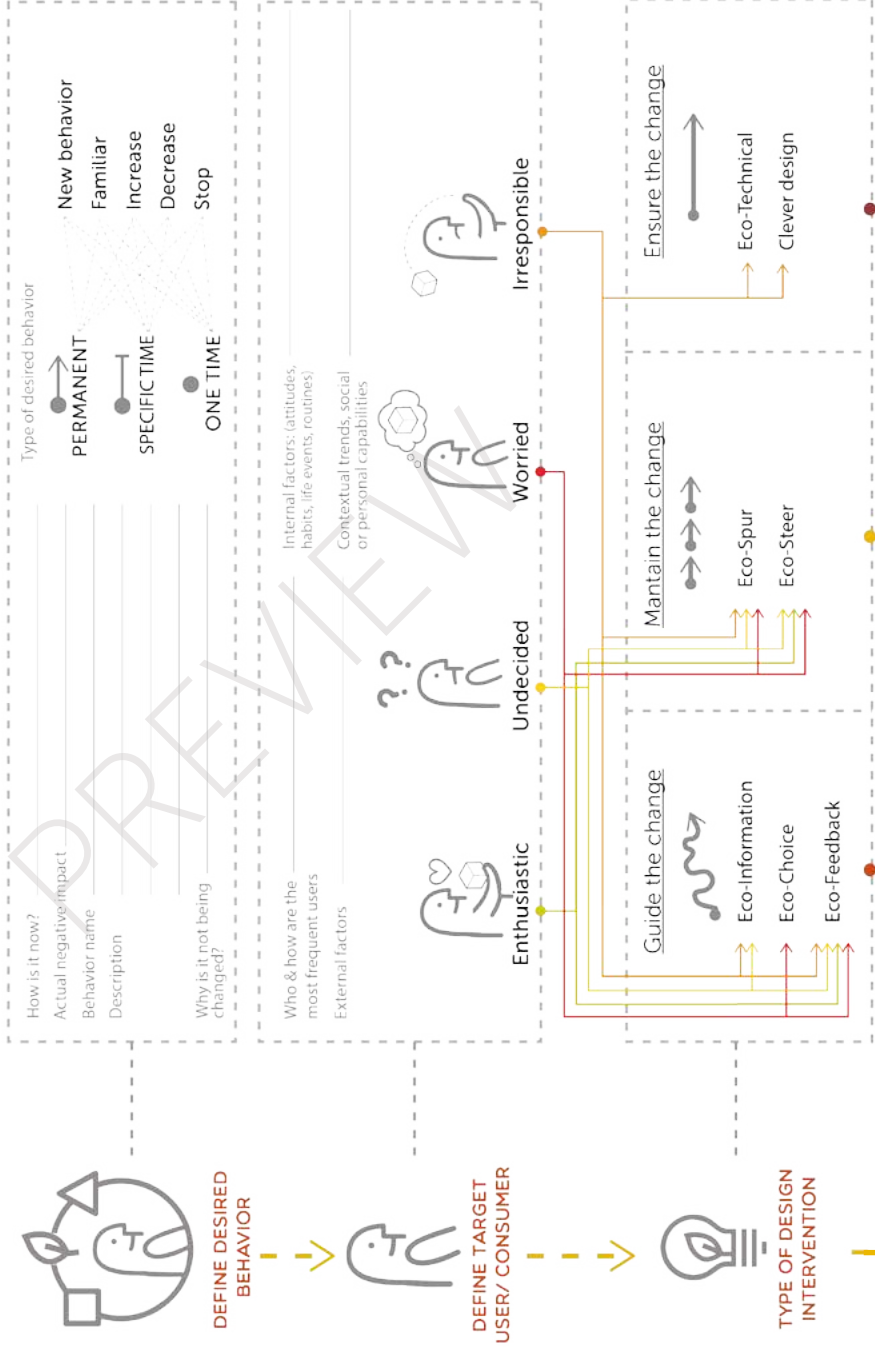
The stages can be used and combined in almost any way, meaning that there is not just one way of using the roadmap. Indeed, experimenting with new combinations and altering the order might be a better solution for some projects in which including as many sustainable touch points as possible is needed.

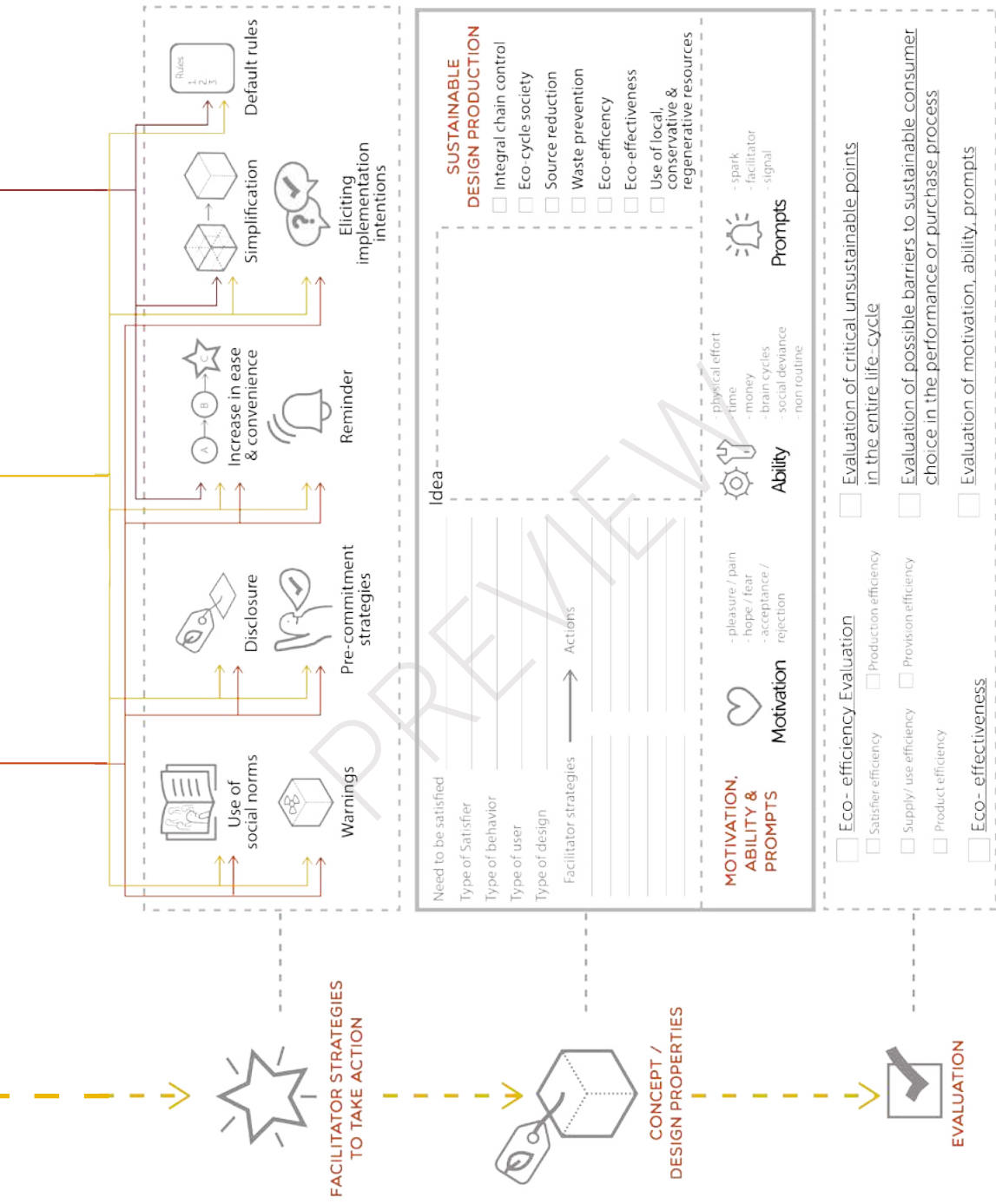
The success of designing a more sustainable intervention that changes consumer behavior involves finding the right combination between conceptualizing, developing, prototyping and evaluating ideas through a continuous process of gradual improvements.



DESIGNING SUSTAINABLE CONSUMPTION ROADMAP

Project _____





By following this roadmap during the design process, the tool should assist designers from start to finish in looking for opportunities to introduce potentially new, more sustainable and more effective solutions, remove weak points during the life cycle of products, and bridge the intention-behavior gap.

As with any other design method, there is no absolute right or wrong way to employ sustainable design and consumer behavior change tools and strategies. A successful project involves finding a relevant and workable combination that can conceptualize, develop and prototype ideas through an iterative process of gradual improvement.

It is important to acknowledge that the structure of the tool has a cyclical approach. This means that at every stage of the design process, it might be necessary to take a step back or even start again from scratch or consider the lessons learned and reformulate the targeted behavior to be sure that the outcome will be sustainable.

Download for free the *Designing Sustainable Consumption Roadmap* template at www.makethembehave.com and start designing more sustainable interventions.



This free version of the book only contains the first chapter and the roadmap template.

To get the full version with all the graphics, infographics and the two remaining sections ROADMAP and CASES visit our website www.makethembehave.com and get your hard cover book or ebook.

While I worked on this book, I reflected that design for sustainable consumption offers a holistic mindset with a sustainable consumer-centric approach. It helps producers to produce better and consumers to consume better. Designers, the industry and policy makers must reconsider their work and the value they generate from a sustainable perspective. Transforming design approaches, products and services is a major part of the thinking and action required to address sustainable consumption. It is indeed true that design plays an increasingly important role in shaping users' awareness, desires and behaviors.

***The turning point for a sustainable future
is to acknowledge it.***

The change goes on...

Online Website

Please visit the website: www.makethembehave.com

This site offers the roadmap and a variety of bonus content available for free.

Support the book

If you liked the book and the content was useful to you, I would be grateful if you shared your review of the book on Amazon or wherever you purchased it and tell your friends and share it via your online channels.

Reviews mean a lot to the authors and the success of the book.

Thank you,

Adriana Olaya Rodriguez

What can I do for you?

I am actively looking to collaborate with researchers, policy makers, designers and interested people to help shape the future of business, interventions, and policies.

I am experienced at speaking, training and coaching on the topic of sustainable consumer behavior change. Consider contacting me for any or all of the following:

- Deliver personal sustainable consumer behavior change consulting
- Co-create sustainable consumer behavior change interventions
- Lead a workshop with your organization

Organizations cited

bauchplan, www.bauchplan.de

Patagonia, www.patagonia.com

Ministry of Environmental and Sustainable Development of Colombia, www.minambiente.gov.co/

Soy eColombiano, www.soyecolombiano.com/

EVA, <https://www.evavzw.be>

Ministry of Finance and Consumption of Sweden, <http://www.government.se/>

The Keeper, <https://keeper.com/>

FairPhone, <https://www.fairphone.com>

Original Unverpackt, <https://original-unverpackt.de/>

RECUP, <https://recup.de/>

The Behavior Wizard, <http://www.behaviorwizard.org/>

Eco-indicator 99, www.pre.nl

DEEDS, www.deedsproject.org

References

Basics & Roadmap

A

1. 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: <http://dx.doi.org/10.1016/j.jenvp.2005.08.002>
2. Anderson, J.R. (1982). 'Acquisition of cognitive skill' *Psychological Review*, 89, 369-403.

B

3. Bhamra, T., Lilley, D., & Tang, T. (2015). *Design for Sustainable Behavior: Using Products to Change Consumer Behavior*. The Design Journal. 14:4, 427-445 Loughborough University, UK.
4. Bhamra, T., Lilley, D., Tang, T. (2008) Sustainable use: changing consumer behaviour through product design. Department of Design & Technology, Loughborough University, Loughborough, LE11 3TU
5. Bhamra, T., Lilley, D., & Tang, T. (2011). *Design for Sustainable Behavior: Using Products to Change Consumer behavior*, The Design Journal, 14:4, 427-445. Loughborough University, UK.
6. Brook Lyndhurst (2004). *Bad Habits and Hard Choices* Brook.
7. Broms, L., Bång, M., & Hjelm, S.I. (2009). Persuasive engagement: exploiting lifestyle as a driving force to promote energy-aware use patterns and behaviors. In D. Daling, C. Rust, L. Chen, P. Ashton, & K. Freidman (Eds.), *Proceedings of Undisciplined! Design Research Society Conference* (pp. 369/1-10). Sheffield: Sheffield Hallam University.

8. Blincoe, K., Fuad-Luke, A., Spangenberg, J.H., Thomson, M., Holmgren, D., Jaschke, K., Ainsworth, T., Tylka, K. (2009). DEEDS: a teaching and learning resource to help mainstream sustainability into everyday design teaching and professional practice. *Int. J. Innov. Sustain. Dev.* 4(1), 1–23.
9. Buchanan, R. (1985). Declaration by design: rhetoric, argument, and demonstration in design practice. *Design Issues*, 2(1) 4-22.
10. Burgbacher, G. (1991). Materialwirtschaft und Umweltschutz - Grundlagen einer schadstoffarmen Produktion. In: Burgbacher, G., and Roth, K.: Neuordnung der Abfallwirtschaft. Reihe Innovative Abfallwirtschaft. Band 1, Expert Verlag, Ehningen, pp. 35-47.
11. BUND/Misereor, (1996). *Zukunftsfähiges Deutschland* (Birkhauser, Basel).

C

12. Cass R. Sunstein, *Nudging: A Very Short Guide*, 37 *J. Consumer Pol’y* 583 (2014).
13. Chapman, J., Gant, N. (2007). *Designers, Visionaries and Other Stories: A Collection of Sustainable Design Essays*.
14. Coskun, Aykut; Erbuğ, Çiğdem (2014). *User diversity in design for behavior change*. Department of Industrial Design, Middle East technical University, Ankara, Turkey.
15. Crilly, N. (2011). Do users know what designers are up to? Product experience and the inference of persuasive intentions. *International Journal of Design*, 5(3), 1-15.
16. Crocker, R. & Lehman, S. (2013). *Motivating change: Sustainable design and behavior in the built environment*. Oxford, UK: Routledge.
17. Co-op Bank (2000), ‘Ethical Consumerism’, London, Mori.

D

18. Darnton, A. for Defra (2004). *The Impact of Sustainable Development on Public behavior: Report 1 of Desk Research commissioned by COI on behalf of Defra*.
19. Durning, A.T. (1992). *How Much Is Enough? The Consumer Society and the Future of the Earth*. W. W. Norton Company

E

20. Earth overshoot day. (2017) <https://www.overshootday.org/newsroom/press-release-english-2017-calculator/> . Accessed 14.03.2018
21. Environmental Change Institute (2005). 40%house Report, Oxford University, Oxford.
22. Environmental Resources Limited (1993). Ministry of Housing, Physical Planning and the Environment: The Best of Both Worlds. Sustainability and Quality Lifestyles in the 21st Century. Publikatiereeks milieustrategie, Nr. 23. Department for Information and International Relations. The Hague.
23. Erskine, C.C. and Collins, L. (1997). Eco-labelling: success or failure? *The Environmentalist* 17: 125-133.

F

24. Findeli, A. (2001). Rethinking Design Education for the 21st Century: Theoretical, Methodological and Ethical Discussion. *Design Issues*; 19
25. Fry, T. (1993). Re-Thinking Ecodesign. *Object*, 43 (Autumn); 31.
26. Fogg, BJ (2017). The Behavior Wizard. Persuasive Tech Lab, Stanford University. <http://www.behaviorwizard.org/wp/behavior-grid/> accessed 28/08/2017
27. Fogg, BJ (2009). A Behavior Model for Persuasive Design. Persuasive Tech Lab, Stanford University.

G

28. Galbraith, B. (2013). The Designer Nudge - Defining the Role of Design in Behavior Change.
29. Gardner, G.T. & Stern, P.C. (1996). Environmental problems and human behavior. Allyn & Bacon.
30. Gloppen, M. (2016). Nudging: How human behavior is affected by design
31. Goepel, N.; Rahme, M.R.; Svanhall, F. (2015). Strategic Recommendations for the Design of Nudges towards a Sustainable Society. Blekinge Institute of Technology Karlskrona, Sweden.
32. Government Offices of Sweden. (2016) Strategy for sustainable consumption. www.government.se/ Accessed 03.01.2018

33. Grunert, Klaus G. (2011). Sustainability in the Food Sector: A Consumer Behavior Perspective. *International journal on food system Dynamics*. Denmark.
34. Gust, I. (2004). Strategies to promote sustainable consumer behavior – The use of the lifestyle approach. Lund University. Sweden.

H

35. Halpern, D. et al. (2004) Personal responsibility and changing behavior: the state of knowledge and its implications for public policy Prime Minister's Strategy Unit.
36. Holdsworth, M. (2003). Green Choice, What Choice? NCC.
37. Hearne, S.A. and Aucott, M. (1991-1992). Source Reduction versus Release Reduction: Why the TRI Cannot Measure Pollution Prevention. In: *Pollution Prevention Review*, Winter, pp. 3-17.
38. HM Government (2005). *Securing the Future: delivering UK sustainable development strategy* TSO.
39. Hunnes, M.G. (2016). *Annual Review of Policy Design - Original Research Nudging: How human behavior is affected by design*. Norwegian University of Science and Technology. Norway.

J

40. Jackson, T. (2005). *Motivating Sustainable Consumption: A Review of Evidence on Consumer behavior and behavioral Change [A Report to the Sustainable Development Research Network as part of the ESRC Sustainable Technologies Programme]*. Guildford: Centre for Environmental Strategy, University of Surrey.
41. Jelsma, J. (2006). Designing 'moralized' products. In P. P. Verbeek & A. Slob (Eds.), *User behavior and technology development: Shaping sustainable relations between consumers and technologies* (pp.221-223). Berlin, Germany: Springer.

K

42. Kaptein, M., Lacroix, J., & Saini, P. (2010). Individual Differences in Persuadability in the Health Promotion Domain. In T. Bloug, P. Hasle, & H. Oinas-Kukkonen (Eds.), *Proceedings of the 5th International Conference on Persuasive Technology* (pp. 94-105) Copenhagen: Springer Berlin Heidelberg.
43. Kirman, B., Linehan, C., Lawson, S., Foster, D., & Doughty, M. (2010). There's a monster in my kitchen: using aversive feedback to motivate behavior change. In

E. Mynatt, & D. Schoner (Eds.), Proceedings of CHI '10 Extended Abstracts on Human Factors in Computing Systems (2685-2694). New York: ACM.

44. Koskijoki, M. (1997). 'My favourite things'. In Van Hinte, E. *Eternally Yours: Visions on Product Endurance*. Rotterdam: 010 Publishers, 132–143.

L

45. Lilley, D. (2009). Design for sustainable behavior: strategies and perceptions. *Design Studies*, 30, pp.704-720.
46. Leire, C. and Thidell, Å. (2005). Product-related environmental information to guide consumer purchases – a review and analysis of research on perceptions, understanding and use among Nordic consumers. *Journal of Cleaner Production* 13: 1061-1070.
47. Leonard, A. (2007). *The Story of Stuff*.
48. Lockton, D., Harrison, D., & Stanton, N.A. (2010). The design with intent method: A design tool for influencing user behavior. *Applied Ergonomics*, 41(3), 382-392.

M

49. Max-Neef, M. (1989), *Human scale development*. New York, USA
50. Mackenzie, D. (1997). The Role and Responsibility of the Designer. *Ecodesign: The Journal of the Ecological Design Association*.
51. McCalley, L. T., & Midden, C. J. H. (2002). Energy conservation through product-integrated feedback: The roles of goal-setting and social orientation. *Journal of Economic Psychology*, 23, 589–603.
52. McDonough, W. and Braungart, M. (2009). *Cradle to Cradle: Remaking the Way We Make Things*. London: Vintage.
53. McKenzie-Mohr, D., L.S. Nemiroff, L. Beers, and S. Desmarais. (1995). 'Determinants of responsible environmental behavior'. *Journal of Social Issues*, 51: 139-156.
54. Ministry of the Environment and Natural Resources, Sweden (1993). *Ecocycle Bill ready*. In: *Workshop Proceedings of the International Workshop on Product Oriented Environmental Policy*. The Hague.
55. Ministry of Housing (1994). *Physical Planning and the Environment*, The Hague. Annex 6, pp. 149-151.

N

56. Narodoslowsky, M. (1993). Die Vision der Nachhaltigkeit. In: Veranstaltungsreihe Strategien der Kreislaufwirtschaft. Tagungsband zum Symposium Forschungs- und Entwicklungsprobleme der Kreislaufwirtschaft. 23. und 24. Technische Universität Graz, pp. 37-50.
57. Narodoslowsky, M. (1992). Kreislaufwirtschaft - ein neues technologisches und ökologisches Paradigma. In: VT newsletter, 7. Jahrgang, pp. 23-26.
58. National Consumer Council. Sustainable Development Commission. (2006). I will if you will. Towards sustainable consumption. UK.

O

59. Oinas-Kukkonen, H., & Harjumaa, M. (2009). Persuasive systems design: Key issues, process model, and system features. *Communications of the Association for Information Systems*, 24(1), 28.
60. Overshoot Day (2017). www.overshootday.org Accessed 27.01.2018.

P

61. Paff Ogle, J., Hyllegard, K., Dunbar, B. (2004) Predicting Patronage Behaviors In A Sustainable Retail Environment. Adding Retail Characteristics and Consumer Lifestyle Orientation to the Belief-Attitude-Behavior Intention Model. Colorado State University. US.
62. Petkov, P., Köbler, F., Foth, M., & Krcmar, H. (2011). Motivating domestic energy conservation through comparative, community-based feedback in mobile and social media. In Kjeldskov, J. & Paay, J., (Eds.), *Proceedings of the 5th International Conference on Communities and Technologies* (pp. 21-30). New York: ACM.
63. Pratkanis, A., Breckler, S., Greenwald, A. (2014). *Attitude Structure and Function*. Psychology Press.
64. Pré Consultants. (2000). *Eco- indicator 99 Manual for designers*. Netherlands.

R

65. RAF Foundation (2012). *Keeping the Nation Moving. Facts on Parking*. UK.
66. Rex, E., Baumann, H. (2007). Beyond ecolabels: what green marketing can learn from conventional marketing. *Journal of Cleaner Production* 15: 567-576.
67. Reuters (2015). BMW's car-share service says 38 pct of clients abandon ownership. <https://de.reuters.com/article/bmw-drivenow-displacement/bmws->

car-share-service-says-38-pct-of-clients-abandon-ownership-idUKL8N0Z-C3YR20150626

68. Rosenberger, G (2001). Denkanstöße zu den Zukunftsperspektiven des nachhaltigen Konsums, In U Schrader, U Hansen (Eds.) Nachhaltiger Konsum: Forschung und Praxis im Dialog (pp. 437-444). Frankfurt: Campus Verlag.
69. Roser, M., Ortiz-Ospina, E. (2018). - "World Population Growth". Published online at OurWorldInData.org. Retrieved from: '<https://ourworldindata.org/world-population-growth>' [Online Resource]

S

70. Schiffman, L., Lazar L. (2015). Consumer Behavior. 11th edition. Pearson India.
71. Sinus (2015). Information on Sinus-Milieus®, SINUS Markt- und Sozialforschung GmbH, Heidelberg http://www.sinus-institut.de/fileadmin/user_data/sinus-institut/Downloadcenter/20150805/2015-01-15_Information_on_Sinus-Milieus_English_version.pdf.
72. Stam, F.C. (1994). Integrated Chain Management and Framework of Product Oriented Environmental Policy in the Netherlands. In: Workshop Proceedings of the International Workshop on Product Oriented Environmental Policy. The Hague, September 30th - October 1st, 1993. Ministry of Housing, Physical Planning and the Environment, The Hague, pp. 21-27.
73. Stegall, N. (2006). Designing for Sustainability: A Philosophy for Ecologically Intentional Design. *Design Issues*, 22(2), 56-63. doi: 10.1162/desi.2006.22.2.56.
74. Stern, P. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, 56 (3), 407-424.
75. Schäfer, M. (2002). Die täglichen Mühen der Ebene – von Ansprüchen und Widersprüchen nachhaltigen Konsumverhaltens. In G Scherhorn, C Weber (Eds.), *Nachhaltiger Konsum: Auf dem Weg zur gesellschaftlichen Verankerung* (pp. 63-71). München: Ökom Verlag.
76. SustainAbility. (1995). Who Needs it? Market Implications of Sustainable Lifestyles. London: SustainAbility
77. Spangenberg, J.H. (2013). Design for sustainability (DfS): Interface of Sustainable production and Consumption. SERI Germany e.V., UFZ Helmholtz Centre for Environment Research, Cologne, Halle, Germany.
78. Spangenberg, J.H. Fuad-Luke, A., Blincoe, K. (2010). Design for sustainability (DfS): the interface of sustainable production and consumption. *J Clean Prod.*

79. Sustainable Consumption Roundtable (2006). I will if you will - Towards sustainable consumption, May Available at www.sd-commission.org.uk/publications/downloads/I_Will_If_You_Will.pdf.
80. Strategy for sustainable consumption (2016). Ministry of Finance Sweden. Sweden

T

81. Tang, T. (2010). Towards sustainable use: design behaviour intervention to reduce household environment impact.
82. Thaler, R., & Sunstein, C. (2008). Nudge: Improving decisions about health, wealth, and happiness: Yale University Press.
83. The Worldwatch Institute (2004). State Of The World. The consumer society. New York.
84. Thøgersen, J. (2002). Promoting green consumer behavior with eco-labels. In T. Dietz & P. Stern (Eds.), *New tools for environmental protection: Education, information, and voluntary measures* (pp. 83-104). Washington DC: National Academy Press.
85. Triandis, H.C. (1977). *Interpersonal Behavior*. Monterey, CA: Brooks/Cole.
86. Tromp, N., Hekkert, P., & Verbeek, P. (2011). Design for socially responsible behavior: A classification of influence based on intended user experience. *Design Issues*, 27(3), 3-19.
87. Trydeman Knudsen, M., Qiao Yu Hu, Luo Yan, Fonseca de Almeida, G., Santiago de Abreu, S., Halberg, N., Langer, V. (2011) Transport is important in the carbon footprint of imported organic plant products. University of Copenhagen, Aarhus University, China Agricultural University, ICROFS.

U

88. Ueda E. (2015). Aptitudes of Industrial Designers Towards Eco design - A Survey of Japanese Industrial Designers During the Early Activities of Ecode-sign. *Bulletin of Japanese Society for Science of Design (JSSD)* 2015; 62.
89. Ueda E. (2015) Industrial Designers Working Towards and Eco-Innovation Approach. *Bulletin of JSSD* 2015 62 (1): 11-20.
90. UK Secretary of State for Environment, Food and Rural Affairs. (2005). *The UK Government Sustainable Development Strategy*. UK.

91. UN. Responsible consumption and production. Why it matters. http://www.un.org/sustainabledevelopment/wp-content/uploads/2016/08/16-00055L_Why-it-Matters_Goal-12_Consumption_2p.pdf accessed 14.03.2018
92. UN. Sustainable Development Goals. Goal 12: Ensure sustainable consumption and production patterns. <https://www.un.org/sustainabledevelopment/sustainable-consumption-production/> accessed 14.03.2018
93. UNEP (2011). Decoupling natural resource use and environmental impacts from economic growth, A Report of the Working Group on Decoupling to the International Resource Panel.
94. UNEP (2016). Global Material Flows and Resource Productivity. An Assessment Study of the UNEP International Resource Panel.. Schandl, H., Fischer-Kowalski, M., West, J., Giljum, S., Dittrich, M., Eisenmenger, N., Geschke, A., Lieber, M., Wieland, H.P., Schaffartzik, A., Krausmann, F., Gierlinger, S., Hosking, K., Lenzen, M., Tanikawa, H., Miatto, A., and Fishman, T. Paris, United Nations Environment Programme.

V

95. Van Weenen H. (1999). Design for sustainable development Unknown Binding. Ireland.
96. Van Weenen, J.C. (1990). Waste Prevention: Theory and Practice. Thesis. Delft Technical University. Castricum.
97. Van Weenen, J.C. (1995). Sustainable Product Development and Waste Management. Paper presented at the 'Dublin Conference on Local Agenda 21', Dublin.
98. Veenhoven, R. (1983). The Study of Life Satisfaction. Erasmus University, Rotterdam.
99. Vermeir, I., Verbeke, W. (2006). Sustainable food consumption: Exploring the consumer "attitude-behavioral intention" gap
100. Verplanken, B. and Faes, S. (1999). 'Good intentions, bad habits and effects of forming implementation intentions on healthy eating'. *European Journal of Social Psychology*, 29, 591-604.
101. Verplanken, B., and Wood, W. (2006). 'Interventions to break and create consumer habits'. *Journal of Public Policy and Marketing*, 25, 90-103.

W

102. WCED World Commission on Environment and Development, (1987). Our common future The Brundtland report. Oxford University Press.

103. Wood, G., & Newborough, M. (2003). Dynamic energy-consumption indicators for domestic appliances: environment, behavior and design. *Energy and Buildings*, 35(8), 821-841.
104. Worldwatch Institute (2011). *The State of Consumption Today. Innovations that Nourish the Planet today.*
105. Worldwatch Institute (2004). *State Of The World State Of The World.*
Special Focus: The Consumer Society. Washington, DC

References

Cases

Responsible consumption of plastic bags in Colombia

- <http://ecoosfera.com/2010/07/la-invasion-de-las-bolsas-de-plastico-y-sus-consecuencias/>
- <http://www.fruitysacks.com/philosophy/>
- <http://www.seeturtles.org/ocean-plastic/>
- <http://www.theworldcounts.com/stories/interesting-facts-about-plastic-bags>
- http://www.cleanup.org.au/PDF/au/cua_plastic_bag_usage_around_world_august-2015.pdf
- <https://www.reusethisbag.com/reusable-bag-infographics/plastic-bag-bans-world.php>
- <http://www.wwf.org.co/?265410/WWF-lanza-campaa-ReemBLSale-al-planeta>
- www.soyecolombiano.com/

Thursday veggie day

- <https://www.evavzw.be/fr/jeudiveggie>
- Vilijoen A., Wiskerke J. *Sustainable Food Planning: Evolving Theory and Practice.* 2011
- https://visit.gent.be/en/thursday-veggieday?from_category=3406&context=tourist
- <http://www.nycfoodpolicy.org/veggie-thursday-ghent-urban-food-policy-snapshot/>
- <http://www.dw.com/en/ghent-ditches-meat-and-makes-thursday-veggie-day/a-14939409>

Swedish Tax breaks for repairing services

- <https://archive.epa.gov/epawaste/nonhaz/municipal/web/html/>
- [http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Municipal_waste_generated_by_country_in_2005_and_2015,_sorted_by_2015_level_\(kg_per_capita\).png](http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Municipal_waste_generated_by_country_in_2005_and_2015,_sorted_by_2015_level_(kg_per_capita).png)

- <https://www.mnn.com/lifestyle/responsible-living/blogs/swedish-government-wants-reward-citizens-who-repair-instead-toss>
- <http://www.independent.co.uk/news/world/europe/sweden-repairs-tax-waste-reduction-plan-a7318131.html>
- <http://www.npr.org/2016/10/02/496282845/sweden-proposes-tax-breaks-for-repairs>
- <https://www.pri.org/stories/2017-01-02/sweden-tries-curb-buy-and-throw-away-culture-through-tax-breaks>
- <https://www.theguardian.com/world/2016/sep/19/waste-not-want-not-sweden-tax-breaks-repairs>

Patagonia

- <http://www.wri.org/blog/2017/07/apparel-industrys-environmental-impact-6-graphics>
- Claudio, L. (2007). Waste Couture: Environmental Impact of the Clothing Industry. *Environmental Health Perspectives*, 115(9), A449–A454.
- <http://www.patagonia.com/environmental-campaigns.html>
- J. B. MacKinnon (2015) Patagonia's Anti-Growth Strategy
- <https://www.newyorker.com/business/currency/patagonias-anti-growth-strategy>
- <https://www.triplepundit.com/2011/11/patagonias-message-black-friday-dont-buy-jacket/>

The Keeper menstrual cup

- National Center for Health Research, Tampon Safety. <http://www.center4research.org/tampon-safety/> Accessed 27.02.2018
- Branch, F., Woodruff, T.J., Mitro, S.D., & Zota, A.R. (2015). Vaginal douching and racial/ethnic disparities in phthalates exposures among reproductive-aged women: National Health and Nutrition Examination Survey 2001–2004. *Environmental Health Environ Health*, 14(1)
- Ashley, R.M., Souter, N., Butler, D., Davies, J., Dunkerley, J., & Hendry, S. (1999). "Assessment of the Sustainability of Alternatives for the Disposal of Domestic Sanitary Waste." *Water Science Technology* 39.5 . 251-58. ScienceDirect. Elsevier Science. Web. 24 Feb. 2016.
- "Cotton vs Rayon Production Steps - Barnhardt Purified Cotton." Barnhardt Purified Cotton. Barnhardt Natural Fibers. Web. 24 Feb. 2016.
- Dodge, Matt. "Procter & Gamble to Expand Maine Tampax Factory." *BDN Maine*. Mainebiz, 13 Nov. 2012. Web. 12 Mar. 2016.
- Edana. Tampons From Raw Materials To Your Supermarket Shelf. Digital image. Web. 2 Mar. 2016.
- Kane, Jessica. "Here's How Much A Woman's Period Will Cost Her Over A Lifetime." *The Huffington Post*. *TheHuffingtonPost.com*, 18 May 2015. Web. 24 Feb. 2016.
- The Keeper. <https://keeper.com/>

Fairphone

- <http://www.greenpeace.org/international/en/news/Blogs/makingwaves/smart-phones-planet-toxic-waste/blog/58828/>
- <https://www.bcorporation.net/community/fairphone/>
- <https://www.fairphone.com/en/>

Original Unverpackt

- <https://shop.original-unverpackt.de/>
- http://ec.europa.eu/eurostat/statistics-explained/index.php/Packaging_waste_statistics
- <https://www.theguardian.com/sustainable-business/2014/sep/16/berlin-duo-supermarket-no-packaging-food-waste>

reCUP

- <http://www.dw.com/en/germanys-love-for-coffee-to-go-leaves-environmental-groups-demanding-action/a-36689719>
- <http://www.bbc.com/news/magazine-36882799>
- www.recup.de

Freiluftsupermarkt

- Satterthwaite, D., McGranahan, G., Tacoli, C. (2010) "Urbanization and Its Implications for Food and Farming." *Philosophical Transactions of the Royal Society B: Biological Sciences* 365.1554: 2809–2820. PMC. Web. 30 Jan. 2018.

Partago

- Bondorová, B., Archer, G. *Transport & Environment*. (2017) Does sharing cars really reduce car use?
- The Guardian. What's the carbon footprint of... a new car? <https://www.theguardian.com/environment/green-living-blog/2010/sep/23/carbon-footprint-new-car>. Accessed 27.02.2018
- Statista. Percentage of households owning a car in selected countries in 2014, by country <https://www.statista.com/statistics/516280/share-of-households-that-own-a-passenger-vehicle-by-country/>. Accessed 27.02.2018
- Partago. What we do. <https://www.partago.be/wat-doen-we.html> Accessed 27.02.2018

wagnisART

- Wolfe, A., Malone, E.L., Heerwagen J., Dion, J. (2014) *Behavioral Change and Building Performance: Strategies for Significant, Persistent, and Measurable Institutional Change Prepared for the USA*. Department of Energy under Contract
- Othman, A. (2011) *Improving Building Performance through Integrating Constructability in the Design Process*. British University in Egypt.
- United States Environmental Protection Agency. Sources of Greenhouse

Gas Emissions. <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions#commercial-and-residential>. Accessed 08.03.2018

- United States Environmental Protection Agency. Global Greenhouse Gas Emissions Data. <https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data#Sector>. Accessed 08.03.2018
- OECD. (2008) Household Behaviour and the Environment. Reviewing the Evidence

Icon copyright

gears by TS Graphics from thenounproject.com

maintenance by Yu luck from thenounproject.com

car by Yu luck from thenounproject.com

government by Yu luck from thenounproject.com

usability test by Yu luck from thenounproject.com

bicycle by Yu luck from thenounproject.com

global warming by Yu luck from thenounproject.com

light bulb by Yu luck from thenounproject.com

deer by Yu luck from thenounproject.com

deforestation by Yu luck from thenounproject.com

water pollution by Yu luck from thenounproject.com

nuclear power plant by Yu luck from thenounproject.com

cube by DaanDirk from thenounproject.com

attributes by Yu luck from thenounproject.com

