

At Home with Sustainability

From Green Default Rules to Sustainable Consumption

Hale, Lara Anne

Document Version
Final published version

Published in:
Sustainability

DOI:
[10.3390/su10010249](https://doi.org/10.3390/su10010249)

Publication date:
2018

License
CC BY

Citation for published version (APA):
Hale, L. A. (2018). At Home with Sustainability: From Green Default Rules to Sustainable Consumption. *Sustainability*, 10(1), Article 249. <https://doi.org/10.3390/su10010249>

[Link to publication in CBS Research Portal](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

If you believe that this document breaches copyright please contact us (research.lib@cbs.dk) providing details, and we will remove access to the work immediately and investigate your claim.

Download date: 04. Jul. 2025



Article

At Home with Sustainability: From Green Default Rules to Sustainable Consumption

Lara Anne Hale

Department of Management, Society and Communication, Copenhagen Business School, Dalgas Have 15, 2000 Frederiksberg, Denmark; lh.msc@cbs.dk; Tel.: +45-4242-1774

Received: 26 October 2017; Accepted: 17 January 2018; Published: 18 January 2018

Abstract: Although it is often assumed that default rules affect change without awareness, this paper suggests that contrast with the default and transition into conscious adoption of the default design may be the starting point to establish long-term changes in consumer behavior. Despite the rooting of default rules in subconscious decision-making, this research finds that, ultimately, awareness drives the demand necessary for the creation of sustainable consumption. Whereas direct appeal to individuals has a disappointing level of influence on sustainability choices, it is understood that green consumers do come from somewhere. *Green default rules* offer interesting prospects for sidestepping the drawbacks of direct marketing to individuals. Under green default rules, behavior is guided by a default, such as utilities automatically sending customers renewables-sourced instead of fossil-fuel-based energy. To act otherwise requires additional effort and is less likely. Motivated by a need to understand how defaults might bridge standards and sustainable consumption, I investigate how organizational processes potentially lead from standardized green default rules to individual awareness that can spread and facilitate sustainable consumption. This paper examines the Active House sustainable building demonstrations in Europe in order to understand how (1) communications and market creation and (2) responsible, user-centered experimentation are organized to move from defaults to sustainable consumption.

Keywords: green default rules; sustainable consumption; sustainable building; standardization; smart home; default bias; automation

Setting an example is not the main means of influencing others, it is the only means.
—Albert Einstein

1. Introduction

Historically, human behavior inside the home and how people used resources like energy or water was not politicized or analyzed extensively; however, modern environmentalism is now changing the amount of attention paid to the environmental impact of residential housing [1]. Yet as broader societal change around climate change is slow, policy-makers are putting increasing pressure on individual behavioral change, including in the home [2]. However, awareness and marketing campaigns targeting individuals' sustainable consumption have proven to be largely ineffectual [3], largely because there is a gap ("green gap") between what consumers express as their intention of behaving and how they behave [4]. Rather, research suggests that long-term sustainability behavior is driven by a collective conservation context [5]. But how is that collective sustainable consumerism created in the first place? This is important for us to understand, as sustainability transitions and natural resource conservation rely on the proliferation of such a conservation culture. If individual consumers cannot be directly motivated, what processes underlie wider conservation cultures? In building, the choices in design can affect individual consumption, resulting in homes that are designed in such a way that living a more sustainable life becomes automatic—conveniently swerving around questions of individual values and motivation. The prospect is attractive, and, as such, *green default rules*—rules that determine

sustainability-oriented default behavior [6,7]—are increasingly used as a policy tool and being designed into homes. Yet, there is something between these experiences and the responsible innovation of a wider community supporting conservation. I attempt to show that there is an organizational standardization process between the inception of default rules and large-scale behavioral change towards sustainability. Motivated by a need for better understanding of how organization and policy-making are linked to sustainable consumption, this paper explores how green default rules are standardized and, ultimately, used to create an awareness and potential starting point for a culture of conservation that furthers sustainable consumption. The findings provide initial insights into the underexplored middle ground between default rules and enduring changes to consumer behavior.

As the study of *choice architecture*, or ‘organizing the context in which people make decisions’ [8] (p. 3), is blossoming, we know from Thaler and Sunstein’s seminal book—*Nudge: Improving Decisions About Health, Wealth, and Happiness*—that nudging is about designing choice architecture in such a way as to encourage small behavioral changes [8]. Default rules are a form of nudging, being the design of which particular choice is automatic, as are green default rules, where the default choice is designed to be environmentally or sustainability-oriented [6]. To act otherwise, consumers would have to consciously choose to *not* act in this fashion—a much less likely scenario [6,9]. For example, Brown et al. studied how reducing the default thermostat setting in office buildings by 1 °C affected workers’ willingness to work in slightly cooler temperatures [10]. They found that, given some of the workers’ thermostat interventions, the thermostat would not stay at this reduction, but it would still be set lower than it was previously by an average of 0.38 °C. Similar outcomes have been found in studies in areas such as environmentally friendly household electricity supply [11,12], healthy food [13], and proper waste disposal [14], among others. Examples of how these defaults can affect your home consumption include when it does not occur to you to turn on the kitchen lights before dark because the design allows for natural daylight in this space; or when the taps just run on a low water pressure and low temperature setting, without your consideration of the resources being saved. The more we grasp default rules’ breadth and impacts, the more significant it becomes to understand how these rules stimulate a larger-scale change.

Venturing down this road evokes a number of overlying claims and complexities. Green default rules are promoted as valuable because of their higher effectiveness compared to that of awareness campaigns. On the other hand, Fielding et al. indicate that one of the most influential aspects of a household’s resource use is the family’s shared conservation values [15]. They argue that their research points towards support for policies that facilitate long-term change in attitudes. And as organizations are deeply involved in the experimental governance surrounding international sustainability efforts, particularly through voluntary measures like standards [16], industry is often involved in such policies. The research herein implicates a process leading from the experience of an industry’s sustainability products or services—such as occurs with the implementation of green default rules—to industry standards that promote a culture of conservation. This research offers initial insights into the intersection of default rules, standards, and long-term behavioral change. The term *standardization*, as used here, refers to the process of using models and/or scripts to establish an infrastructure of voluntary rules. The research investigates how Active House, a strategic alliance, organizes the standardization of green default rules in sustainable building using building experiments. Active House has developed (and continues to develop) a sustainable building standard and has experimented with its application since its conceptual beginning in 2009 across 26 building demonstration projects. The evaluation of these experiments continuously feeds back into both the standard and the communication of the standard’s core concept: combining comfort, energy, and environment into sustainability design. This research delved into 3 of the 26 demonstration projects, while reflecting on the standardization process, and finds early indications that a key aspect is the building inhabitants’ consciousness of the value of the green defaults, suggesting a more nuanced process in moving from lack of awareness to decisive choice than established in the default rules literature thus far. What makes this consciousness aspect significant within choice architecture is that

default rules are assumed to function based on subconscious preferences, whereas these demonstration projects in the early stages of standardization suggest, rather, a transition from the subconscious effect to a conscious realization, which could have meaningful implications for organizations' and policy-makers' efforts to instigate sustainable consumption.

The paper proceeds through the following sections: the theoretical concepts used in the study; the method of study; the background of the case; an analysis of the case; and discussion of the implications for behavioral campaigns and the development of green default rules.

2. Default Rules and Standardization

As the adaptation of choice architecture concepts for sustainability policies is very recent—especially in regards to green default rules, a term coined in 2008 [11]—this paper draws on literature from sociology, legal studies, and psychology, fields that have employed and researched these concepts longer, in order to explain how they are thought to work. For example, by guiding behavior through setting the starting choice, default rules work through status quo bias [12,17]. This means that individuals are most likely to choose to do nothing when faced with new options [17,18]. One difference between the foci of status quo bias and default rules is the role of awareness. Whereas research on the status quo bias shows that an individual will consciously select to stick with what has been previously chosen, default rules research explores the impact of an outside entity choosing the status quo, and the rules are thought to have an effect without the individual's awareness. Therefore, default rules thus come in contrast to direct attempts to influence behavior through, for example, marketing and incentives—attempts subject to the green gap. They arise from research demonstrating that awareness is ineffective at encouraging change. Rather, in spite of declared interest in environmental protection, awareness and interest do not necessarily translate into action: "Numerous studies however demonstrate that providing information does not necessarily lead to changes in behavior [. . .] More than four out of five Nordic citizens are concerned about the environment, yet only about 10–15% state they buy green products on regular basis, while the actual market for green products remains at only 3.6% in Sweden [19]" [20] (p. 14). Further, recent research suggests that the effect of defaults is powerful enough to influence consumers even when they have been informed of other entities setting the default [21]. Green default rules are a way of setting a default that *influences* behavior by taking advantage of the status quo bias: an individual enters a new situation or infrastructure, the default aims at sustainability, and this default becomes (or at least nudges) the reference point for the individual. Ideally, it becomes their status quo.

The literature is in agreement that this initial effect of default rules falls in the realm of un- or subconsciousness. Some of the earliest references to this unawareness come from the legal field, in relation to contract law. Barnett refers to default rules as being based on *tacit assumptions* which unfold without occurring to a person, and which remain unexpressed [22]. He further points to Heald and Heald, who describe how defaults affect behavior: "The process occurs in a mindless, nonconscious manner, and once invoked, the script provides a map for subsequent behavior" [23] (p. 1151). More recent works from policy and sociology research uphold the role of unawareness in default rules' influence on behavior. Van Benthem et al. argue that defaults work through a gradual revision of beliefs, with no role for knowledge or awareness [24], and Dhingra et al., when exploring the dynamics of default pull (similar to status quo bias), remark: "Additionally, we have shown evidence that the default pull happens outside of the decision maker's awareness; almost all of our subjects denied that they were affected by the presence of a default despite statistical evidence to the contrary, and a sizeable portion of our subjects reported not even noticing the presence of defaults" [25] (p. 75), lining up with Steffell et al.'s conclusions on decision-makers' denial of influence [21]. Smith et al., in their appropriately named article "Choice without Awareness", place default rules in a category of tools that work under the auspice of unawareness, including measurement, framing, and placebo effects [26].

On the other hand, standards work to make visible and script invisible rules, enabling diffusion for the establishment of widespread behavioral change. If a set of actors standardize their intentions in the form of green default rules and integrate them into a standard (such as building specifications), the standard will do the influential work from thereon out [27]. This is to distinguish between standardization, as defined above, and *standards*. Standards are a form of rules similar to laws, likewise written or documented in some way, but they are distinguished by their voluntary nature [28], moving them from the realm of authority to the realm of legitimacy [29]. Despite their voluntary nature, they are in fact significant governance mechanisms [28,30,31]. As Brunsson et al. describe, standards “are a powerful tool for challenging and altering institutionalized behavior and identities” [30] (p. 620). From this viewpoint, standardization and standards are pivotal in networks that work to institutionalize behavioral change [32], especially since addressing norms and habits is considered fundamental to choice architecture [6,8,20]. They are also thus significant for responsible innovation. To be clear about the terms as used herein, default rules are voluntary, undocumented rules that set the status quo; standardizing is the process of establishing an infrastructure for such rules; and standards are documented (materialized) voluntary rules (Table 1). These exist along a continuum of awareness, with default rules influencing without consciousness; standardization processes starting to experiment with awareness levels; and standards being open and communicated. In other words, this paper takes the stance that default rules become embedded in standards through a process of increased awareness, usually by experiencing a contrast to the default (i.e., moving from a house with natural daylight to a dark house).

Table 1. Rule forms and modes of influence along increasing awareness gradient (Source: own composition).

	Rule Category	Form	Mode of Influence	Examples
Increasing Awareness	Default rules	Status quo setting, starting point when individuals make no changes. Not necessarily written, but in example of energy, this is a documented choice by utility companies.	Status quo bias, psychological barrier to making changes.	Thermostat temperature setting, type of utilities energy used by a household (renewables vs fossil fuels).
	Standardization	Activity of using models, scripts, language to make a shared infrastructure for a process or outcome.	Experimentation and consensus among stakeholders about how interests are incorporated into infrastructure.	Development of the FTSE4Good responsible investment index [33], the formation of technological platforms such as Java [34].
	Standards	Written or otherwise documented voluntary rules that can be communicated.	Legitimacy, rational myths, and power of communicative technologies.	Fair Trade certification, International Standards Organization (ISO) standards, LEED green building standard.

The study of the standardization of green default rules in the built environment touches upon many overlapping dimensions rife with tension, especially when examining the space between the standard and sustainable consumption. In their study on sustainable housing adaptation, Gabriel and Watson identify the gradual changes to both building and building owner as being on “a middle road between physical determinism and the privileging of human agency” [35], likewise hinting at a gradient between the design of physical objects and the conscious choices of people. Mont et al. also argue that sustainable consumption is made up of neither nudging nor active choices alone—rather, that choice architecture helps along prosustainable thinking and acting individually and leads to greater societal changes [20]. We know that individual users build up networks and start movements for creating new consumption norms [36], and we know that sustainable consumption is influenced by individuals’ perceptions of social norms [37,38]. This is important to note because a culture of conservation cannot be made without being based on people—the standardization must be developed

with attention to what people want or need. This is because of the market-driven, demand nature of both the cultures of consumerism and conservation, which are two sides of the same coin.

The building field is an interesting arena in which to study how defaults relate to both responsibility and a larger scale of conservation culture. As Thaler and Sunstein describe: “A crucial parallel [with traditional architecture] is that there is no such thing as a ‘neutral’ design. [. . .] As good architects know, seemingly arbitrary decisions, such as where to locate the bathrooms, will have subtle influences on how the people who use the building interact” [8] (p. 3). In other words, there exist critical interdependencies between infrastructures—be they physical or virtual—and behavior. Standardization is a form of infrastructure-building, and indeed, standardization of interest-driven design into material objects is fundamental to choice architecture. Instead of directly standardizing behavior, a choice architect standardizes the design of the infrastructure within which daily life is carried out. In the case of default green rules, the idea is to design the infrastructure in such a way that instead of expecting consumers to choose to sustainable behavior, it is the default action, making other selections more challenging [6,7]. Thus, default rules are similar to standards in that they are voluntary and make nonadherence difficult [21,29], yet they differ by their invisibility and the lack of awareness surrounding them, arguably making responsibility even more significant. How these building experiments are set up, who the standards-makers are, and so on, are discussed in the following case description.

3. VELUX and Active House Defaults

The issue of resource consumption in buildings—or, otherwise put, the need for a culture of conservation in the built environment—is a pressing sustainability challenge for both European governments and industry. Energy consumption is a major factor, with households accounting for 27% of Europe’s total energy consumption [39], and around 9% of all European freshwater goes to the operational use of buildings, with 72% of that being consumed in residential buildings for purposes such as showers, toilet water, and laundry [40]. On the Europe-wide regulatory side, resource consumption in buildings has driven such EU directives as the 2010 Directive on Energy Performance of Buildings (EPBD) [Directive 2010/31/EU] and the 2012 Energy Efficiency Directive [Directive 2012/27/EU], yet industry initiatives are essential for compliance with these directives within member states. Alliances, certification schemes, and whole-neighborhood-scale projects have been emerging in an effort to reimagine building practice. And yet, building modeling and simulation fail to anticipate actual building performance, which is subject to consumer behavior [41]. As both public and private sectors appeal to consumers to change their consumption patterns, citing ethical imperatives and the benefits of lower costs, the focus on the technically perfect, resource-efficient building overshadows the human.

In 2009, on the heels of the UN Congress of the Parties (COP) 15 climate summit in Copenhagen, VELUX A/S, a rooftop windows manufacturer (with headquarters in Hørsholm, Denmark), launched Model Home 2020. The idea was straightforward: to use existing knowledge and technologies to demonstrate that we are able to build human-centered sustainable homes with natural light and fresh air to the standard anticipated for 2020. Yet they were limited in what they could demonstrate on their own—and as there were many others (for example, Rockwool and Danish Technical University) interested in human-centered sustainable building, VELUX decided to engage with other building organizations and became the principal founder of the Active House Alliance, a strategic alliance aiming to bring the principles of health and comfort into stipulations for sustainable building. Their three design foci, represented by three concentric circles, are environment, energy, and comfort, thus establishing the Model Home 2020 projects as the first demonstrations of the Active House principles. These foci are portrayed for simplicity’s sake in order to say that, in addition to the energy and environmental aspects many certification schemes address, comfort must also be addressed. On the one hand, incorporating design for comfort into building specifications fashions a more desirable

vision for sustainable building, but it also poses a challenge: could standards concerned with human behavior also influence consumer behavior in the home?

In order to explore this question (among others), VELUX and Active House have showcased 26 demonstration projects, mostly in Europe and with more under development. These have mainly been residences, but some have been public buildings such as schools. The Active House Alliance is herein considered the standards-maker, with 37 membership organizations and a secretariat—though it is worth noting that VELUX plays a leadership role in the alliance and is often the primary organizer of the demonstration projects. The three experiments empirically studied here are Sunlight House in Vienna, Austria; LichtAktiv Haus in Hamburg, Germany; and RenovActive in Brussels, Belgium. Many of the demonstration projects undergo thorough monitoring and evaluation. Postconstruction, they are monitored without inhabitants and act as design experimentation (to compare with the virtual model) and open houses. Then, a test family is selected to live in the house for a one-year period, rent free, in exchange for participation in what the industry calls “postoccupancy monitoring”, including sensor systems, resource use, and sociological (in the form of interviews and blog-writing) monitoring. These families are selected based on a competition and evaluation of the most typical family (usually not particularly green-oriented)—with the exception of RenovActive, which follows the queuing procedures of the social housing company. Thereafter, the family has a priority option to buy the home, or it is put on the market. All of the technical and sociological data are assembled, analyzed, and put together in an evaluation report. These evaluations are then shared with the Active House Alliance, and ultimately shape future project designs and priorities, i.e., the demonstrations are both showcases and experiments, the outcomes of which feed into future experimentation.

In this case, the demonstrations serve as the foundational fabric of choice architecture, facilitating standardized ‘green’ decision-making at home and the design of defaults across multiple homes. One example of a default rule is *You will not turn on lights until natural daylight is unavailable*. Using architectural expertise and design tools with a focus on natural daylight as a parameter, the demonstrations are constructed to optimize natural daylight levels, say, by using light tunnels and windows and orienting daytime activity rooms to be the most light-rich. The rule sets the status quo as carrying out activities—reading, cooking, playing with children—in a natural light environment, which in contrast to low-lit or artificially-lit environments is both healthier and saves electricity. Another example is *Your space will be cooled with natural ventilation when too warm or stuffy for comfort*. Utilizing temperature and carbon dioxide sensors, the building’s combined natural and mechanical ventilation system will open windows automatically to cool a room when it is becoming too warm or the carbon dioxide levels are too high (the latter being a danger we cannot usually sense ourselves). This rule sets the status quo as ventilating space with fresh air, which again, in contrast to electrical ventilation systems, is both healthier and saves electricity. These are just a few of the default rules designed into the demonstrations, none of which are explicit, and all of which leave open possibilities for acting otherwise (i.e., turning on the lights during the day, or shutting the windows manually). This leads into the presentation of how default green rules are standardized for scaling, but first, the following section briefly describes the method of study.

4. Materials and Methods

As the concepts and processes studied herein are inherently social (i.e., design, monitoring, communication), this research takes an inductive, qualitative approach. I use the case study method in order to assemble a rich description of surrounding phenomena and to—in the spirit of studying processes—“retain the holistic and meaningful characteristics of real-life events” [42] (p. 4). In referring to the *case*, I’m thus referring to the collective outcome of the research on Active House standardization with a focus on VELUX as the principal founder, whereas the objects of study are the demonstration projects and their users. The projects studied empirically herein are residential buildings in three different countries. They were selected in order to represent the diversity of new build, part-new/part-renovation, and renovation projects, as well as differences in the conceptualization

of the home across regions. At the same time, they are all single-family homes at the cutting edge of sustainability design in the residential building sector. Sunlight House, located in Pressbaum, Austria (on the outskirts of Vienna), is Austria's first zero-energy house, and is in fact often operating as a plus-energy house, one which feeds electricity back into the grid system. LichtActivHaus is a part-new build and part-renovation project that is part of the International Building Exhibition (IBA) (<http://www.iba-hamburg.de/en/iba-in-english.html>) in Hamburg, Germany. RenovActive is a budget renovation project underway in cooperation with a social housing company in Anderlecht, Brussels, Belgium.

The most informative data in regards to studying green default rules in standards were the VELUX and Active House communication materials. These were particularly important for identifying the emergence of an organizational and political interest in consumer behavior within the home. Most of the materials are VELUX-sourced, as they are a primary co-founder of Active House and my research partner, but the materials also reflect the activity of the alliance: cooperation among diverse stakeholders in order to shift building practice. An example would be the overall Model Home 2020 evaluation, which was conducted by Grontmij and largely influenced the second generation of the Active House specifications. The documents utilized herein include the Active House specifications, guidelines, brochures, reports, and public presentations. Major early reports on the demonstration projects included the aforementioned overall alliance cooperation and technical building performance evaluation of the Model Home 2020 projects; a comparison of energy performance across the projects; a study of automation and control of indoor climate systems; and a report on the socio-psychological monitoring results—though this last focuses on the parameters and characterization of well-being in the home, rather than consumer behavior. However, in an Active House Workshop presentation in Budapest, Hungary in November 2014, the director of VELUX's Sustainable Living in Buildings program pointed towards a growing interest in how the demonstration projects have affected the test families' consumption patterns and attitudes towards sustainability. Exploration into this emerging topic was furthered in the interviews.

I conducted visits to each of the demonstration project cities and, through cooperation with the VELUX headquarters in Denmark, I was introduced to each of the local VELUX offices and given an overview of the projects before delving into interviews. As the Active House Alliance is well-networked throughout these places, VELUX was able to give me initial contacts to invite for interviews, as well as invite me to relevant sustainable building events in the area. The interview guide I employed for all interviews included general introductions, as well as more targeted questions such as *What do you think the purpose of the demonstrations is?* or *What are the most important qualities in a building to you?* however, exploration beyond the guide was often the most informative. The logic was to investigate the interviewees' relationships with building, sustainability, design, and standardization. In total, I conducted 30 semistructured interviews with a variety of actors, including architects, engineers, home-owners, and policy-makers. I interviewed one Active House home-owner directly, informally interviewed two other Active House home-owners, discussed the influence of the Active House demonstrations on the housing of all interviewees, and analyzed Active-House-recorded text and video interview material from four other Active House home-owners. This data was the most significant for understanding behavior, consumption, and awareness; in particular, the interviews shed light on how physically experiencing contrast over time affected perceptions and behavior.

I visited the four case homes (the three empirical cases, plus the Garden of Venus house in Wachau Valley, Austria); in the cases of the Sunlight House and Garden of Venus, the homeowners also gave me a tour inside the homes. I was also given a tour inside the uninhabitable, pre-renovation state of the RenovActive building in 2014, and then another tour after completion, but before habitation in 2016. The events I attended were the Active House Guidelines Workshop in Brussels, the Passive House 2014 Exhibition in Brussels (including a tour of the new Brussels Regional Environmental Offices, Passive House certified), the 2014 Northern Germany Passive House Conference in Neumünster, the 2015 Bauz! Vienna Congress for Sustainable Building, and the 2015 VELUX Daylight Symposium

in London. These events enabled me to position the interviews amidst the larger European building field; understand the advancement of building design, including in relation to behavior; get a sense of the significance of the demonstration projects and their locations; and witness how building demonstrations are used to communicate and influence. These reflections were kept in mind while reviewing the VELUX and Active House communications material, both internal and externally aimed at different sales, marketing, and policy-making audiences. These communication materials were also significant for analyzing how Active House communicates with the same consumers they seek to influence towards sustainable consumption. The data is thus composed of communication materials, semistructured interviews, and notes and transcribed recordings from industry events and visits, allowing for validation across sources.

The interview data and notes from the events and site visits were then loaded into data analysis software (NVivo) (QSR International, Melbourne, Australia) in order to better organize and track surfacing patterns (Table 2). The first cycle of interview data coding was an open coding process, identifying and grouping segments of text (from half a sentence to one paragraph in length) into coding themes—mainly identified and noted during the initial review and transcribing of the data. I consider this stage pivotal in the overall coding process, a dimension of analysis that helps deepen reflections [43]. “Technology” was a main theme in this cycle, including references to both technological design and monitoring. After recognizing the technology theme, I revisited the pertinent references and, upon revision, found a number of other interrelated themes, highlighted by topics brought up in both my research stay and events data. The second cycle consisted of condensing these segments and organizing them based on persistent patterns; these segments of data were further organized into subthemes. Two of these patterns—concerning user focus and monitoring & standards—became the foundation of this paper. It must be noted that default rules were not originally a focus, but blossomed as the standard’s evaluative emphasis on consumer behavior took root, especially relating to the data on *change over time* and *nudging*. In order to understand how the demonstrations were being used in this regard, the communication materials and field notes proved to be the most useful for making sense of the green default rules in the building sector and the standardization process. As such, the analysis utilizes these, with support from interview data. Borne out of these materials, an analysis of how green default rules move through standardization to kindle a conservation culture is presented in the next section.

Table 2. Data themes and coding process (Source: own composition).

First Coding Cycle			Second Coding Cycle		
Theme	References	Sources	Theme	References	Sources
Technology	175	21	Proliferation	6	3
Cities	55	19	<i>Subthemes: general, sensing, beyond sensing</i>		
Cost	142	24	Interaction	18	8
Daylight	46	13	<i>Subthemes: altogether, automation, adaptation & time, interference, overkill</i>		
Demonstration	78	21	User focus	11	7
Institution	192	24	<i>Subthemes: control as positive or negative, change over time, beyond control</i>		
Legitimacy	46	12	Social monitoring	2	2
Measurement	121	23	<i>Subthemes: none</i>		
Scale	50	17	Monitoring & Standards	12	7
System	94	20	<i>Subthemes: monitoring for standards, nudging, what standards do for people</i>		

5. Standardization: Awakening the Defaults

The analysis herein elucidates the organizational process of setting green default rules into building standards. Further, it attempts to shed light on how standardized green default rules can eventually give way to a contrast that generates individual awareness of the value of sustainable design. It shows how experimental green default rules are standardized towards multitudinous audiences (including policy-makers, practitioners, researchers, and consumers) to establish a market

for sustainable consumption, along an increasing awareness gradient, as outlined in Figure 1. The circle represents an opaque construct, whereas the squares represent observables. It is fundamental that green default rules are *not explicit*, but that they are embedded in specifications for building design. Further, the connection between green default rules and sustainable consumption is dashed, representing its potential. These processes do not necessarily directly link the rules and sustainable consumption, but rather organize towards this connection. Thus, this analysis is exploratory—the subsurface nature of green default rules, and the emergent, surprising nature of experimentation converge in an industry open to innovation, and embracing new interests and strategies as they arise.

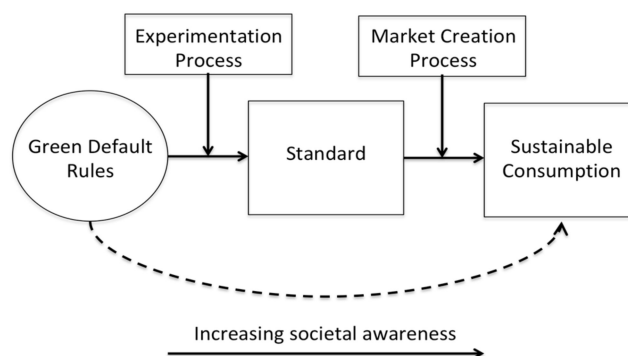


Figure 1. From green defaults to sustainable consumption through standards (Source: own composition).

First, in Sections 5.1 and 5.2, I highlight aspects of two forms—representing just a couple of many—of standardizing the Active House default rules and the experimental demonstrations: the Sustainable Living in Buildings platform and the Circadian House Report. Each, in some way, adapts the green default rules built into the demonstrations and standardizes them for a different audience, driving one side of market creation in industry and policy. As on the one hand, there are markets spurred by industrial norms, and on the other, there are markets inspired by social movements, these materials give a brief glimpse into how standardization works green default rules into the built environment. Thereafter, Section 5.3 introduces how those experiencing the sustainable buildings undergo a conscious change. These experiences suggest the creation of an awareness that may initiate sustainable consumption through the activities of both legislators and consumers.

5.1. Sustainable Living in Buildings Communicative Platform

The Sustainable Living in Buildings (SLiB) Communicative Platform is VELUX's main platform for communicating the company's sustainability activities, interests, and materials. It embodies the company's 'onion model' which embeds from the outer layer inwards: the global level through the UN Global Compact (<https://www.unglobalcompact.org/>), society level through Active House, business level through VELUX products, and household level through Healthy Homes (http://www.velux.dk/~media/marketing/master/documents/pdf/brochures/velux_hhb_18032015.pdf). The purpose is to centralize information and serve as a resource to any VELUX employee when communicating sustainability to stakeholders, including specifiers, end-users, and policy-makers. An example of how it is used to lobby is the involvement of key Brussels policy-makers in VELUX's Healthy Buildings Day, the annual one-day conference centered around SLiB. The second-tier placement of Active House implicates the demonstration projects as the key lever for influencing sustainability on a societal level and interacting with other key stakeholders. When summarizing activities on the societal level, the platform states: "Among other things:

- We are discovering new solutions through full-scale building experiments and research, establishing in-depth knowledge and applicable solutions.

- We are engaging in dialogue with politicians and stake-holders in the building industry, initiating experiments and sharing knowledge.
- We are influencing the agenda of sustainable buildings via cooperation and argumentation" [44].

Packaging these activities together reveals how the design aspects of the demonstration projects, including green default rules, are standardized in the building field: a combination of experimentation, dialogue, joint projects, knowledge-sharing, and lobbying.

Likewise, it is through these activities that the green default rules can be conveyed into other projects. The platform encourages using the projects as a main argumentation and design modeling tool, and presents photos, quotes from residents, and measurement data in one place: "One of the most effective ways of communicating SLiB is through cases from real life proving the advantages of the Active House principles in action. During the last decade, the VELUX Group has participated in a large number of projects that we now make available as easy-to-use case stories as part of the communication platform. [...] The case stories collect the information, facts and photos that you need to tell the story of the buildings in brochures, newsletters, websites, presentations, trade shows, PR activities, etc." [44]. Thus, the SLiB platform is the best compiled, succinct resource for standardizing the default rules in Active House across multiple audiences. In the next example, on the other hand, a particular feature (circadian-related design) is made explicit.

5.2. Circadian House Principles and Guidelines

The Circadian House principles and guidelines report, released in November 2013, was developed with the aim of standardizing how health (as related to circadian rhythms) is considered in building design. The report was compiled through workshops, with the support of multiple stakeholders external to VELUX: "The workshops were carried out by scientists and consultants specialized in healthy buildings, indoor environment, architecture and planning from November 2012 to August 2013" [45] (p. 2). As the report points out, there is not currently an official definition of healthy housing, but the report can be used "to guide and improve the design of residential buildings of all types, including apartment buildings, and are applicable to both new and existing dwellings" [45] (p. 2). This, in part, relates to the previous example of green default rules on light—as much in relation to natural daylight during activity as to darkness during rest. It structures the standardization of default rules in the form of key performance indicators (KPIs) that can be benchmarked, including building site and orientation; contact to nature; view to the outside; healthy light; healthy indoor air; elimination of emissions from building materials and consumer products; healthy thermal environment; good acoustics; and building controls.

The report first refers to the definition of circadian rhythms as found in ISO 16817: 2012, the International Organization for Standardization's standard covering building environment design, indoor environment, and design process for visual environment, indicating the standardization direction of the report. It then hints at the role of default rules in building design: "Being physically active is a big part of a healthy lifestyle and this is where the home should promote the occupants to be active, without putting additional stress on their lives. A nice, inviting staircase and an easily accessible garden are examples" [45] (p. 5). Note the emphasis on not disturbing the awareness of the occupants. Through these examples and the KPIs, the report presents what reads like ingredients in a design recipe for working default rules into circadian design, where the green default rules are the design input, and the KPIs measure their effectiveness against other design formulations. Finally, it draws on the Active House homes, referring to benchmarks established through demonstrations and pointing to the Active House specifications for further reading. The evaluation of these homes serves as an example of how one can verify whether or not the green default rules designed into the building are effective. Guiding in this fashion appears to be a significant aspect of the standardization process. The next segment examines what actually happens amidst the design for defaults.

5.3. Awakening Sustainable Consumption

The first point concerning awakening default rules is that standards anticipate building legislation that reshapes society. For example, BINE provides a graph showing the learning curve for energy-efficient construction, wherein German building demonstration projects precede matching legislative changes [46]. Demonstrations work as experiments that ‘prove’ the practicality of regulating to a higher level by matching technology and coding with the most advanced insights into social responsiveness. In the Northern Germany Passive House Conference in 2014, Hans Dieter Hegner, Head of Division at the German Federal Ministry of Transport, Building and Urban Development, points out: I am responsible for sustainable construction, but also for the construction research (own translation). He continues on to describe how the German government’s demonstration project partnerships (highlighting Effizienzhaus Plus in Berlin) rely on measurements (We have 256 measurement points. So we want to know everything (own translation)) and work to refine specifications based on building experimentation. In his presentation, Hegner refers mostly to the Active Plus specifications (following a similar ideology as Active House); he praises how successful they have been at advancing the standardization of sustainable building: Also, an important element (of changing building practice) is that we need to make good architecture to make it convincing (own translation). At the same conference, renowned architect Manfred Hegger reflected on Active House’s Licht Aktivhaus project as being a starting point for shifting focus to the wellbeing of residents in sustainable building in Germany. This is not in the least part due to the outcomes of postoccupancy monitoring and the reported experiences of families thereafter.

We can see that the standardization of green default rules is a highly relational process. The described forms of reaching policy-makers were just a few of many. At this point, the standardization process is well underway: the design principles for the green default rules (tried and tested in the experiments) are standardized into several forms of communicative guidelines that inform and negotiate amongst stakeholders, such as architects and policy-makers, and the rules are then expressed in new building experiments, which serve as both further diffusion and a widening of the breadth of knowledge about social effectiveness. But once accepted, as by key figures like Mr. Hegner, is it not enough that perhaps these rules may become mandatory? We know that the desired sustainability behavior may not previously have been the status quo at home, but that the green default rule can be, at least, part of making it so. Yet, as Lone Feifer, Programme Director for Sustainable Living in Buildings at VELUX, underlined during an in-house presentation on 10 March 2016, “You cannot have a new building, ask people to do what they were doing yesterday, and expect something new. That’s not how innovation works”. Eventually, what can be seen is the contrast that the test families experience between their old homes and the demonstration homes, an awakening that drives both political support and consumer demand.

Taking the example of the green default rule relating to homes with more natural light (from windows, light tunnels, orientation, etc.) reducing the use of electricity for artificial light, we can see that, ultimately, a little awareness might go a long way. Two building experts, identified here as Expert 1 (E1) and Expert 2 (E2), describe:

E1: What he did was build the kind of terrace houses [. . .] So everybody had really contact to the sun and to light as one of those ideas. And he said, he put the people out of their homes they had before, and brought them to the new homes. And then he made evaluation, asked 1000 questions. One: where is the light situation better? And they said, ‘It has been good before. It’s good now.’ Okay. And then he puts them back. And then—only then—they said . . . What? ‘It’s dark.’

E2: And that has been the experience with the VELUX experiment too, when the VELUX test families moved back to other homes, then they asked for different light situation. They chose their new home according to light needs. Before they said there’s no problem.

E1: They didn't even recognise it.

E2: And this is, for me, a very strong example for the situation where you do not know what you need before you . . . if you are not really trained to question your feelings. (Interview 13 February 2015)

There are other examples of this, as well, such as in the interview segments highlighted in Table 3. Among these quotations, one can find reflections upon how experiences of different default setups in buildings can instigate an individual awareness, as well as an appreciation and desire to continue living with such defaults. Such is the case with Ismaël, the younger son of the Pastour family, who lived in the Maison Air et Lumiere during the test period (2012–2013). He had been suffering from asthma, but stopped being affected once in the Active House and was even able to cease preventative medication. However, once the family moved to a flat within the same region, the attacks recommenced [47]. Only after moving out were they able to appreciate how dramatically his health is affected by the environmental materials and ventilative design of the home. In some cases, however, it is enough to gradually become aware of changes that have extended over a long enough period of time. The Oldendorf family of LichtAktiv Haus describes how the alteration in building design affected their lighting use: “In our old flat, my first reaction was always to reach for the light switch. In the beginning, I didn't even know where they were in the LichtAktiv Haus—even when it's overcast outside, it's always bright enough inside” [48].

Table 3. Quotes relating to change and awareness from defaults (source: own composition).

Data Type	Interviewee	Date	Quote
Primary, Interview	Active House Home Owner	10 February 2015	“My husband always says, now he realize how bad the air quality is in offices when he has meetings. Yes, so now he realizes how bad the air quality is, and he always opens the windows because here it's normal to have fresh air.”
Primary, Interview	Active House Sociologist	9 October 2014	“This family, when it moved in, we said, ‘So what is the best about this building?’ They said, ‘Oh, I guess it's the size, like, there is so much size and we have this garden. Yes, I think that's the best about it, and yes, perhaps also that it's not really using energy, like, we don't really have to pay for our energy anymore. I think that's good too.’ That was the main aspect. They never really mentioned light at all in the first place, and after just two months or even earlier when we had the second interview, we asked again, ‘So, now you've lived here for two months. So what is the best about this?’ ‘Oh, my god, the light. It's so amazing, we never want to miss it again.’”
Primary, Interview	Active House Engineer	19 September 2014	“We are barefoot in the house, and it's always warm; and the house is never cold, and that feels very comfortable. Also the reactions we get from other people who come in our house: ‘Wow, it's winter, and you're dressed for summer.’ So, yes, we can enjoy the sun that is shining in the house. This is also comfortable. In our previous house this wasn't the case—so I feel that it's just by that. It was just something you realize after some years that when it was nice weather that you had the need to go outside to have some sunshine. [. . .] So you had the need to go away all the time, and that gives you some stress so now we don't have it at all anymore. It feels much more comfortable.”
Primary, Interview	Active House Project Manager	19 January 2015	“[My home is] totally different; 30 years old and, well, with the knowledge I've got now I would say just like a caterpillar. Take it away and make a new one. Unfortunately I have to live with it so I just can try to adapt it, but of course my thinking has changed totally.”
Primary, Interview	Active House Architect	11 February 2014	“A lot of people came there and they said well, I know the house already from the pictures, everybody knew this picture and said, well, it's quite formal. [. . .] And then when they came there, and they were told about the story how we developed it, what is the reason why the roof is like that, where we put the shape, the position of the energy roof, and the things like that. They couldn't understand how it looked like that, and suddenly they said ‘Okay, now it makes sense; now I understand the concept.’ [. . .] So they called me and they said, ‘Are you the architect of the house?’ and I said, yes. ‘Well, you know, we want to live in a house like that, and we didn't get it. So would it be possible if you make us another one?’”
Data Type	Interviewee	Date	Quote

Table 3. Cont.

Secondary, Video Interview	Active House Home Owner	25 April 2017	"Living in an Active House inspired us to change our own home. So we've added in eight skylights and a bunch of insulation to make it more comfortable" [49].
		25 April 2017	"I found now, having lived in such a well lit space, that when I go visit friends, I really take note of a lack of daylight" [50].
Secondary, Video Interview	Active House Home Owner	29 November 2016	"When we first visited the house back in January, I was coming from a home that was built in the 1800s. So when I walk by or sit by the windows back home, you can feel it on your back, and you almost need a blanket at the kitchen table on those cold January days" [51].
		06 February 2017	"[The Active House] has definitely complemented our energy-aware lifestyle, especially in terms of lights. We always make sure the lights are off when we leave a room, but here there's so much daylight that we don't even turn them on to begin with" [52].
Secondary, Video Interview	Active House Home Owner	26 November 2009	"In contrast to our old house, we have the sense that the air is much cleaner, the air exchange of each room is much higher, and the materials are good. So we can definitely feel a difference" [53].
			"We have started a journey as a family, doing something—a common project, and we are learning how we are spending our resources and how we are influencing the climate" [53].

One can imagine multiple scenarios compounding the awareness: a visiting guest notes the difference; a reading book stays open late into the evening; the utility bills plummet. It is especially poignant to note that even if there is already an environmental consciousness, the default can change a family's behavior—such as with the home owner who describes realizing that they do not have to turn off the lights as frequently, as the default design is enabling them to not turn them on in the first place [52]. Examining this phenomenon, the effect of the default rules in sustainable building appears to concern relativity and, surprisingly, awareness. This is not to say that the literature concerning the subconsciousness of default rules is incorrect. Rather, it is to further our understanding of the importance of moving default rules into consciousness as part of the process of creating sustainable consumption. The Oldendorf family's awareness of the contrast was enough to motivate them to mobilize their finances to purchase the home after the monitoring period, making them the first family to buy their tested Active House, though prohibitively expensive for an average family (the trajectory towards affordability of experimental homes like RenovActive in Brussels may change this). Although, as theorized, default rules work on tacit assumptions and the status quo bias, the wider social effect arises from awareness following a period of having experienced the new status quo. The following section discusses the implications of these findings.

6. Discussion

The emergence of awareness of the value of green default rules in sustainable building suggests that there is much to be learned between the design of defaults and those subject to them. The standardization of default green rules paints an intriguing picture of a sustainability future wherein the home is no longer a black box, but an innovation hub for experimenting with green default rules that alter what we take for granted, ideally for the good of society. As Sunstein points out, the issue is not about whether there will be choice architecture, but about who constructs it and how they are legitimated [54]. That innovation and experimentation are part of the standardization process is important to recognize, as the overlapping interests, especially of those living in the homes, must be allowed to experience friction and negotiate a meaningful, desirable reality in practice. This becomes even more meaningful given the potential for individuals to make realizations and decisions based on their experiences with defaults in design. Certainly, learnings from across the demonstrations contribute to adjustments in design that improve green default rules' effectiveness; this kind of adoption and adaptation is a form of innovation itself [55]. One point is that the engagement of multiple experts from different fields in the standardization and communication of the default rules' effectiveness is essential. In this way, the standardization outcomes garner creativity from diverse inputs, as well as legitimacy.

But industry and policy change efforts are not in and of themselves enough for societal change. This underlines the importance of understanding how default rules work in practice during the standardization process, and how active choice enters the scenario. The literature on default rules collectively suggests that these rules effectively influence behavior under design conditions. Yet, as Barnett points out, the designs (and outcomes) of default rules are only as good as the broad assumptions about the communities involved [22]. Hypothetically, then, the better the knowledge of the communities in which default rules are applied, the better the outcomes for society overall. In contemplating the motivation for either industry or consumers to participate in such *smart defaults*—default rules that are welfare-oriented and market-targeting, Smith et al. ask: “[Can] we assume in the first place that the incentives are sufficiently strong for marketers to create consumer welfare-enhancing smart defaults? Are the rewards so evident if the (smart) default effect occurs without awareness?” [26] (p. 168). In response to these questions, this research suggests that so long as this awareness *is* awakening and creating demand, there may indeed be very interesting incentives for both parties. At least ideally, organizations may proceed more swiftly towards lower impact or cradle-to-cradle markets, and consumers may benefit from a raised basic standard of living, as well as healthier, more value-aligned lifestyles.

However, given the prospects of bringing awareness to the value of green default rules, I suggest treading with care into the so-called smartness of default rules. Amidst the choice architecture community, the phenomenon of personalized default rules is gaining ground. Porat and Strahilevitz map the way from active choice toward personalized rules, pointing out that although the concept is not new (as opposed to impersonal default rules), technological advancement has changed the practicality of personalization [56]. They argue that Big Data now enables effective personalized default rules while simultaneously minimizing transaction costs. The Internet of Things (IoT) compiles mass matrices of data on our preferences and behavior that can be used to structure default rules particular to us as individuals, all without us ever having to know. Based on this exploratory paper, I caution against too much personalization on two points. First, I echo Selinger and Whyte’s ethical concerns that the more accustomed we become to having default rules set for us, the less realistic the opt-out option becomes and the more vulnerable we are to manipulation: “The main point, then, is that the more we become habituated to being nudged the less we may be bothered by the incremental introduction of more controlling tactics” [57] (p. 929). Second, the apparent inseparability of market and consumer in this research implies that for default rules for broader social change, such as with green default rules for sustainable consumption, shared social values are needed. Whereas Sintov and Schultz highlight the importance of adjustable controls, consumer trust, and interaction in designing green default rules for sustainable building [7], the findings herein indicate that building users must first experience contrast to be able to take advantage of these dynamics and partake in the design process.

Further along the lines of interconnection between market and consumer, if these changes to design are not appreciated in society unless first experienced and then noted due to their absence, it implies the need for a double-edged sword of political and societal responsibility. Kopelman points to successful choice architecture as being dependent on intervention that is both across policy and legitimate [58]. And, at the same time, the status quo bias also applies to policy reform [59], making the prospect of broad policy change unappealing without awareness of something better. Default rules thus lie in the uncomfortable space in between individuals and the responsibility of the makers of society: the communication is key for organizational reach and policy development, and the experience is key for household change and demand. Their diffusion across households, organizations, and political bodies alike is paramount for large-scale change. The significance of this paper’s findings concerns this middle ground, as an understanding of how default rules can functionally alter conscious choices of consumers grants a new, more informed power to the organizations that standardize default rules. As green default rules are applied more widely, the insufficiency and undesirability of previous designs become apparent, and we become the embodiment of these rules by preference instead. In other words,

perhaps the idea of default rules is not to remove awareness, but to pair it with responsible policy and markets in a more socially sensitive, sophisticated manner.

7. Conclusions

All in all, we now have an initial, but better idea of how default rules are standardized and encroach the realm of awareness. We also have some indication that green default rules need to simultaneously target different parts of society to have a larger scale impact. Still, this research is an early attempt to shed light on the meeting point of green default rules, responsible standardization, and sustainable consumption. With Active House, efforts to establish sustainable consumption for both new and renovated buildings are still in their early stages. As research around choice architecture develops, and pressures on sustainability transitions grow, homes will likely be increasingly targeted for their effects on lifestyles and carbon dioxide emissions alike, and we will need to understand more about what the important design aspects of default rules are and how to responsibly innovate them for society-wide (as opposed to purely personalized) sustainability transitions. But of great importance in these developments is the involvement of the user, and the significance of leaning towards an active, worldview-motivated choice to participate in sustainability transitions, i.e., co-developed transitions.

There is likely much to be learned from other fields, especially those similar to building that combine choice architecture with physical architecture, but this also means that these findings may not extend to less literal infrastructures—for example, the default rule design of product labels. Therefore, I recommend that further research should explore how default rules are standardized in contexts with a diminished role of product or architectural design. Also, further research is needed to explore the role of subconscious (unaware/impulsive) versus conscious (aware/comparative) decision-making in the formation of worldviews that support sustainable consumption. For example, does the awareness-spurred demand for sustainability-oriented buildings entail ripple effects, demand for other sustainability-oriented products, or lifestyle changes? Can multiple industries collaborate to shift worldviews from different pressure points, in a more systems-thinking approach? This research is a starting point for delving into the resetting of status quos that spur both personal and societal change and will hopefully inspire other organizational researchers. It serves as one contribution to the burning question of how we can live better, more sustainable lives and still feel at home.

Acknowledgments: This work was supported by the European Commission’s Marie Skłodowska-Curie Initial Training Network (ITN) under Grant 316604.

Conflicts of Interest: The author declares no conflict of interest.

References

1. Michael, M.; Gaver, W. Home beyond home: Dwelling with threshold devices. *Space Cult.* **2009**, *12*, 359–370. [[CrossRef](#)]
2. Shove, E. Users, technologies and expectations of comfort, cleanliness and convenience. *Innov. Eur. J. Soc. Sci. Res.* **2003**, *16*, 193–206. [[CrossRef](#)]
3. Dolan, P.; Hallsworth, M.; Halpern, D.; King, D.; Vlaev, I. MINDSPACE: Influencing behaviour through public policy. *Mark. Lett.* **2011**, *33*, 1–50.
4. Barbarossa, C.; Pastore, A. Why environmentally conscious consumers do not purchase green products: A cognitive mapping approach. *Qual. Mark. Res. Int. J.* **2015**, *18*, 188–209. [[CrossRef](#)]
5. Nair, S.R.; Little, V.J. Context, Culture and Green Consumption: A New Framework. *J. Int. Consum. Mark.* **2016**, *28*, 169–184. [[CrossRef](#)]
6. Sunstein, C.R.; Reisch, L.A. Green by default. *Kyklos* **2013**, *66*, 398–402. [[CrossRef](#)]
7. Sintov, N.D.; Schultz, P.W. Adjustable green defaults can help make smart homes more sustainable. *Sustainability* **2017**, *9*, 622. [[CrossRef](#)]
8. Thaler, R.H.; Sunstein, C.R. *Nudge: Improving Decisions about Health, Wealth, and Happiness*; Yale University Press: New Haven, CT, USA, 2008.

9. Johnson, E.J.; Goldstein, D.G. Decisions by default. In *The Behavioral Foundations of Public Policy*; Shafir, E., Ed.; Princeton University Press: Princeton, NJ, USA, 2013; pp. 417–427.
10. Brown, Z.; Johnstone, N.; Haščič, I.; Vong, L.; Barascud, F. Testing the effect of defaults on the thermostat settings of OECD employees. *Energy Econ.* **2013**, *39*, 128–134. [[CrossRef](#)]
11. Pichert, D.; Katsikopoulos, K.V. Green defaults: Information presentation and pro-environmental behaviour. *J. Environ. Psychol.* **2008**, *28*, 63–73. [[CrossRef](#)]
12. Kaenzig, J.; Heinzle, S.L.; Wüstenhagen, R. Whatever the customer wants, the customer gets? Exploring the gap between consumer preferences and default electricity products in Germany. *Energy Policy* **2013**, *53*, 311–322. [[CrossRef](#)]
13. Cioffi, C.E.; Levitsky, D.A.; Pacanowski, C.R.; Bertz, F. A nudge in a healthy direction. The effect of nutrition labels on food purchasing behaviors in university dining facilities. *Appetite* **2015**, *92*, 7–14. [[CrossRef](#)] [[PubMed](#)]
14. Wu, D.W.-L.; DiGiacomo, A.; Kingstone, A. A sustainable building promotes pro-environmental behavior: An observational study on food disposal. *PLoS ONE* **2013**, *8*, e53856. [[CrossRef](#)] [[PubMed](#)]
15. Fielding, K.S.; Russell, S.; Spinks, A.; Mankad, A. Determinants of household water conservation: The role of demographic, infrastructure, behavior, and psychosocial variables. *Water Resour. Res.* **2012**, *48*. [[CrossRef](#)]
16. Hoffman, M.J. *Climate Governance at the Crossroads: Experimenting with a Global Response after Kyoto*; Oxford University Press: Oxford, UK, 2011.
17. Samuelson, W.; Zeckhauser, R. Status Quo Bias in Decision Making. *J. Risk Uncertain.* **1988**, *1*, 7–59. [[CrossRef](#)]
18. Kahneman, D.; Knetsch, J.L.; Thaler, R.H. Anomalies: The Endowment Effect, Loss Aversion, and Status Quo Bias. *J. Econ. Perspect.* **1991**, *5*, 193–206. [[CrossRef](#)]
19. Ekoweb. *Ekologisk Livsmedelsmarknad (Organic Food Market)*; Lantbrukarnas Riksförbund (Federation of Swedish Farmers): Stockholm, Sweden, 2013.
20. Mont, O.; Lehner, M.; Heiskanen, E. *Nudging: A Tool for Sustainable Behaviour? Report 664 (December)*; Naturvårdsverket (The Swedish Environmental Protection Agency): Stockholm, Sweden, 2014.
21. Steffel, M.; Williams, E.F.; Podacar, R. Ethically deployed defaults: Transparency and consumer protection through disclosure and preference articulation. *J. Mark. Res.* **2016**, *53*, 865–880. [[CrossRef](#)]
22. Barnett, R.E. The Sound of Silence: Default Rules and Contractual Consent. *Va. Law Rev.* **1992**, *78*, 821–911. [[CrossRef](#)]
23. Heald, P.J.; Heald, J.E. Mindlessness and Law. *Va. Law Rev.* **1991**, *77*, 1127–1137. [[CrossRef](#)]
24. Van Benthem, J.; Velázquez-Quesada, F.R. The dynamics of awareness. *Synthese* **2010**, *177*, 5–27. [[CrossRef](#)]
25. Dhingra, N.; Gorn, Z.; Kener, A.; Dana, J. The default pull: An experimental demonstration of subtle default effects on preferences. *Judgm. Decis. Mak.* **2012**, *7*, 69–76.
26. Smith, N.; Goldstein, D.G.; Johnson, E.J. Choice without Awareness: Ethical and Policy Implications of Defaults. *J. Public Policy Mark.* **2013**, *32*, 159–172. [[CrossRef](#)]
27. Rip, A.; Groen, A. Many visible hands. In *Technology and the Market: Demands, Users and Innovation*; Coombs, R., Green, K., Richards, A., Walsh, V., Eds.; Edward Elgar: Cheltenham, UK, 2001; pp. 12–37.
28. Brunsson, N.; Jacobsson, B. The contemporary expansion of standardization. In *A World of Standards*; Brunsson, N., Jacobsson, B., Eds.; Oxford University Press: Oxford, UK, 2000; pp. 1–17.
29. Kerwer, D. Rules that Many Use: Standards and Global Regulation. *Governance* **2005**, *18*, 611–632. [[CrossRef](#)]
30. Brunsson, N.; Rasche, A.; Seidl, D. The dynamics of standardization: Three perspectives on standards in Organization Studies. *Organ. Stud.* **2012**, *33*, 613–632. [[CrossRef](#)]
31. Thévenot, L. Governing life by standards: A view from engagements. *Soc. Stud. Sci.* **2009**, *39*, 793–813. [[CrossRef](#)]
32. Higgins, W.; Hallström, K.T. Standardization, Globalization and Rationalities of Government. *Organization* **2007**, *14*, 685–704. [[CrossRef](#)]
33. Slager, R.; Gond, J.-P.; Moon, J. Standardization as Institutional Work: The Regulatory Power of a Responsible Investment Standard. *Organ. Stud.* **2012**, *33*, 763–790. [[CrossRef](#)]
34. Garud, R.; Jain, S.; Kumaraswamy, A. Institutional Entrepreneurship in the Sponsorship of Common Technological Standards: The Case of Sun Microsystems and Java. *Acad. Manag. J.* **2002**, *45*, 196–214. [[CrossRef](#)]

35. Gabriel, M.; Watson, P. From Modern Housing to Sustainable Suburbia: How Occupants and their Dwellings are Adapting to Reduce Home Energy Consumption. *Hous. Theory Soc.* **2013**, *30*, 219–236. [CrossRef]
36. Klinglmayr, J.; Bergmair, B.; Klaffenböck, M.A.; Hörmann, L.; Pournaras, E. Sustainable Consumerism via Context-Aware Shopping. *Int. J. Distrib. Syst. Technol.* **2017**, *8*, 54–72. [CrossRef]
37. Lehner, M.; Mont, O.; Heiskanen, E. Nudging—A promising tool for sustainable consumption behaviour? *J. Clean. Prod.* **2016**, *134*, 166–177. [CrossRef]
38. Di Sorrentino, E.P.; Woelbert, E.; Sala, S. Consumers and their behavior: State of the art in behavioral science supporting use phase modeling in LCA and ecodesign. *Int. J. Life Cycle Assess.* **2016**, *21*, 237–251. [CrossRef]
39. Building Performance Institute Europe. Europe's Buildings under the Microscope: A Country-by-Country Review of the Energy Performance of Buildings. Available online: <http://bpie.eu/publication/europes-buildings-under-the-microscope/> (accessed on 20 October 2017).
40. Ecorys. Resource Efficiency in the Building Sector (Final Report). Available online: <http://ec.europa.eu/environment/eussd/pdf/Resource%20efficiency%20in%20the%20building%20sector.pdf> (accessed on 20 October 2017).
41. Gilani, S.; O'Brien, W.; Gunay, H.B.; Carrizo, J.S. Use of dynamic occupant behavior models in the building design and code compliance processes. *Energy Build.* **2016**, *117*, 260–271. [CrossRef]
42. Yin, R.K. *Case Study Research: Design and Methods*, 4th ed.; Volume 5 of Applied Social Research Methods Series; Bickman, L., Rog, D.J., Eds.; SAGE Publications, Ltd.: London, UK, 2009.
43. Miles, M.B.; Huberman, A.M.; Saldana, J. *Qualitative Data Analysis: A Methods Sourcebook*, 3rd ed.; SAGE Publications, Ltd.: London, UK, 2013.
44. *Sustainable Living in Buildings Communicative Platform*; Version 2.0; Document for Internal VELUX Use Only, Necessary Permissions Obtained; VELUX: Hørsholm, Denmark, 2014; Available online: <https://velux.sharepoint.com/sites/VELUXOne/Pages/Communication-Platform%202.0.aspx> (accessed on 18 January 2018).
45. VELUX. Circadian House: Principles and Guidelines for Healthy Homes. November 2013. Available online: <http://thedaylightsite.oxmond.com/wp-content/uploads/papers/Circadian%20House%20-%20Principles%20and%20guidelines%20for%20healthy%20homes.pdf> (accessed on 20 October 2017).
46. BINE. Energy Research on Course to Delivering the Energy Transition. Interview with Dr. Rodoula Tryfonidou (BMW). 3 March 2015. Available online: <http://www.bine.info/en/topics/buildings-city/residential-buildings/news/energieforschung-auf-kurs-zur-energiewende/> (accessed on 20 October 2017).
47. Pastour, S. Video Interview. 12 December 2013. Available online: <http://www.velux.com/innovation/demo-buildings/maison-air-et-lumiere> (accessed on 20 October 2017).
48. VELUX. ModelHome 2020 Brochure. Available online: <http://www.construction21.org/france/data/sources/users/4922/docs/v14417-001-004-002model-homebrochure-2015-def.pdf> (accessed on 20 October 2017).
49. Ibbottson, R. VELUX Conclusion. Video Interview. 25 April 2017. Available online: http://greatgulf.com/activehouse/video_posts/velux-conclusion/ (accessed on 26 December 2017).
50. Ibbottson, B. VELUX Conclusion. Video Interview. 25 April 2017. Available online: http://greatgulf.com/activehouse/video_posts/velux-conclusion/ (accessed on 26 December 2017).
51. Ibbottson, B. Comfort in Active House. Video Interview. 29 November 2016. Available online: http://greatgulf.com/activehouse/video_posts/comfort-in-active-house/ (accessed on 26 December 2017).
52. Ibbottson, B. Active House Energy. Video Interview. 6 February 2017. Available online: http://greatgulf.com/activehouse/video_posts/active-house-energy/ (accessed on 26 December 2017).
53. Anonymous Resident. Active House—Home for Life. Video Interview. 26 November 2009. Available online: <https://www.youtube.com/watch?v=xsKOKexsh2Y> (accessed on 26 December 2017).
54. Sunstein, C.R. Fifty shades of manipulation. *J. Mark. Behav.* **2016**, *1*, 213–244.
55. Rip, A.; Kemp, R. Technological change. In *Human Choice and Climate Change*; Rayner, S., Malone, L., Eds.; Batelle Press: Washington, DC, USA, 1998; Volume 2, pp. 327–399.
56. Porat, A.; Strahilevitz, L. Personalizing Default Rules and Disclosure with Big Data. *Mich. Law Rev.* **2013**, *112*, 1417–1478. [CrossRef]

57. Selinger, E.; Whyte, K. Is There a Right Way to Nudge? The Practice and Ethics of Choice Architecture. *Sociol. Compass* **2011**, *5*, 923–935. [[CrossRef](#)]
58. Kopelman, P. Debate: Tackling obesity—To ‘nudge’ or to ‘shove’? *Public Money Manag.* **2011**, *31*, 236–238. [[CrossRef](#)]
59. Fernandez, R.; Rodrik, D. Resistance to Reform: Status Quo Bias in the Presence of Individual-Specific Uncertainty. *Am. Econ. Rev.* **1991**, *81*, 1146–1155.



© 2018 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).