

The crucial role of habits in energy consumption: an evolutionary approach on changing current patterns

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Abstract

A substantial body of literature has shown that our behaviour is often guided by habits. The existence of habits - not fully conscious forms of behaviour - is important as it contradicts rational choice theory. Their presence thus calls for the setting of new instruments as they make it unlikely that consumers be capable of exercising control over their energy consumption in reaction to given incentives. This is further increased in the evolutionary perspective where the current carbon-based *Socio-Technical System* constraints and shapes consumers' choices through structural forces. Habits being potentially "counterintentional", they may explain the "efficiency paradox" in energy as well as the continued increase of energy consumption despite the rising environmental awareness among the population. Policies aiming at reducing energy consumption should thus specifically address the performance context of habits. For instance, targeting new residents has proven to be more effective given that their preceding habits have been disturbed. The results of our empirical analysis confirm this idea by showing how a change of context makes people more receptive to a proposed measure. Our analysis of the role played by habits also suggests that individuals do not consider the need to change existing habits as an obstacle even though this is contradicted implicitly in the answers they provided to open questions. This "unconsciousness" is one of the most delicate features of habits and it should thus be accounted for when designing measures. Given the other characteristics of habits, the joint use of feedbacks and commitment strategies appears promising.

Introduction

"Most of the time what we do is what we do most of the time" (Townsend and Bever, 2001: 2). This often-quoted sentence within the realm of social psychology is meant to emphasize that much of our behaviour in daily life is characterised by repetition. From the empirical work of Wendy Wood and colleagues (Wood, Quinn and Kashy, 2002; Quinn and Wood, 2005), we know that many activities are not only repetitive in frequency but they also are performed in stable contexts. Such consistency sets a favourable breeding ground for habits (i.e. behavioural predisposition to repeat a well-practiced action given a context) to develop (Ouellette and Wood, 1998). Once formed in those circumstances of both high frequency and stability, habits then become a strong predictor of behaviour "over and above intentions, suggesting that such behaviour is initiated without much deliberation and thought" (Danner et al., 2008: 246).

As already discussed in Maréchal (2009), the concept of habits is essential in analysing the determinants of domestic energy consumption as it sheds an insightful light on the puzzling question of why it keeps rising even though there is an evident increase of awareness and concern about energy-related environmental issues such as climate change. Indeed, if we subscribe to the idea that energy-consuming behaviours - such as switching off the lights, turning off appliances, etc. - are often guided by habits and that deeply ingrained habits can become counterintentional (Verplanken and Faes, 1999), it then follows that people may often display "locked-in" practices in their daily energy consumption behaviour.

Accordingly, the objective of this paper is to provide an illustration of the role played by habits in explaining the reduced effectiveness of traditional instruments such as incentives. More

precisely, it will serve to underline the importance – for policy-makers – of specifically addressing the performance context of habits if they wish to reduce domestic energy consumption. It follows from the analysis performed in this paper that the features displayed by habits should be fully acknowledged and accounted for prior to designing measures aimed at reducing domestic energy consumption.

This paper builds on an empirical analysis that consists of three sets of data. The first one comes from a questionnaire that was submitted to the visitors of the Brussels Motor Shows in the framework of a larger study on “clean vehicles” (Englert et al., 2009). This set is mainly used to illustrate the implications of the specific features displayed by habits such as their low degree of consciousness. The second set of data comes from a sociological study on energy behaviours in the framework of the Brussels Energy Challenge. The objective is to empirically assess of the importance of habits in domestic energy consumption through including two broad questions on habits within the questionnaire submitted to the participants of the Challenge. Finally, the most important empirical analysis contained in this paper is dedicated to demonstrate the higher receptivity to a given measure of those people that recently experienced a change of context (i.e. people whose previously acquired habits have been disturbed). To this end, the complete list of energy subsidies granted in the Brussels Region for the year 2007 is used. This amounts to a sample of 14 348 requests.

At this stage, it is important to mention that looking at domestic energy consumption through using the concept of habits does not preclude the integration of wider societal influences in the picture. The stance of this paper is that habits are all the more useful in that they provide a locus that accommodates for both individual as well as structural and institutional accounts to be integrated in the analysis. As shown in more details elsewhere (Maréchal, 2007), mainstream analyses of the economics of energy consumption have been partly misleading, notably regarding the “Efficiency paradox” (i.e. the existence of unexploited ‘profitable’ investment options in energy-saving technologies and practices). This can be explained not only by the mechanistic nature of mainstream economics but also by its inherent reductionism. However, this should not lead us to resorting solely to collectivist accounts as they are nothing else than the other side of the reductionist coin of social sciences. Acknowledging both that “only by rescuing the individual from its conflation into the social can the social determination of individuality be fully appreciated (Hodgson, 2007: 101)” and that the empirical evidence has convincingly shown that group-level analyses where equally important in explaining the existence of socially-acquired characteristics of human beings (Henrich 2004), we thus need to turn to a framework allowing for both sources of explanation (i.e. structural/collective and individual) to be accounted for. This is obviously also needed for energy consumption analyses where a recent empirical study has shown that the behaviours observed display both “similarity and collectivity” as well as “variety and individuality” (Gram-Hanssen, 2008a: 14).

This imperative can be dealt with using habits for as long as the analysis is performed in a framework building on the idea that individuals and institutions “mutually constitute and condition each other” (Hodgson 1997, 404). To put it differently,

“habits are the constitutive material of institutions” while the presence of institutions make that “accordant habits are further developed and reinforced among the population” (Hodgson (2007, p.107). In line with the need to complete this view *à la Giddens* with the importance of physical structures and technologies (Gram-Hanssen, 2008b: 182), the influencing institution to be analysed in the perspective of this paper is what is termed the *Socio-Technical System* (STS) (Geels 2004). A STS is a clusters of interrelated components connected in a network or infrastructure that includes physical, social and informational elements and that thus involves technology, science, regulation, user practices, markets, cultural meaning, infrastructure, production and supply networks (Unruh, 2000; Shove, 2003; Geels and Kemp, 2007).

Given that a “structure is always both enabling and constraining” (Giddens, 1984: 169), choices in energy consumption are strongly influenced by the existing carbon-based STS through structural, cultural, social and institutional forces such as norms, media, technical designs, etc. More than “willing” consumers should rather be viewed as partly “locked-in” (Sanne 2002). To be functional, people’s habits have to be “accordant” with prevailing sociotechnical forces which shape consumers’ choices towards more energy-consuming ways of life. This can be illustrated by the rise of average internal temperatures in UK houses from 13.8 °C in 1970 to 18.2 °C in 2004¹ while the average number of electric appliances increased from 17 to 47 over the same period of time (Martiskainen, 2008).

Thus the aforementioned mutual constitutiveness of agency and structure makes that habits may be seen as an additional factor of technological stability as their change-resisting nature contribute to maintain the incumbent carbon-based STS. Such a framework thus highlights the presence of two sources of inertia (i.e. at the levels of individuals and at the level of socio-technical systems) that mutually reinforce each other. As shown in figure 1, these two sources of inertia provide part of the explanation for the existence of the efficiency paradox in energy as both cognitive and structural obstacles reduce the effectiveness of incentives and prevent consumers from undertaking profitable energy-efficient investments. Given this context, policies aiming at reducing energy consumption would thus have to deal with both sources of resistance to change². This means not only to shift the incumbent carbon-based STS for it to shape decisions towards the desired direction (i.e. a low carbon economy) but also to deconstruct habits that this same STS has forged with time – as increased environmental awareness and intentions formulated accordingly are not sufficient in the presence of strong contradicting habits.

This paper will specifically focus on habits but the analysis will be performed bearing in mind the broader institutional and social context within which those habits develop. This is in line with the approach followed in Gram-Hanssen (2008c) that builds on Practice theory. Our stance is that habits, through providing stronger foundations to the understanding of interactions between structures and individuals, help to better depict the essence and process of meso dynamics – a level which

1. Even though the range of what people report to be a comfortable temperature is wide, indoor climate are converging (Shove, 2004).

2. Given the mutual constitutiveness, it is also crucial to take into account the interactions between the two types of barriers as also suggested in Wilhite (2007).

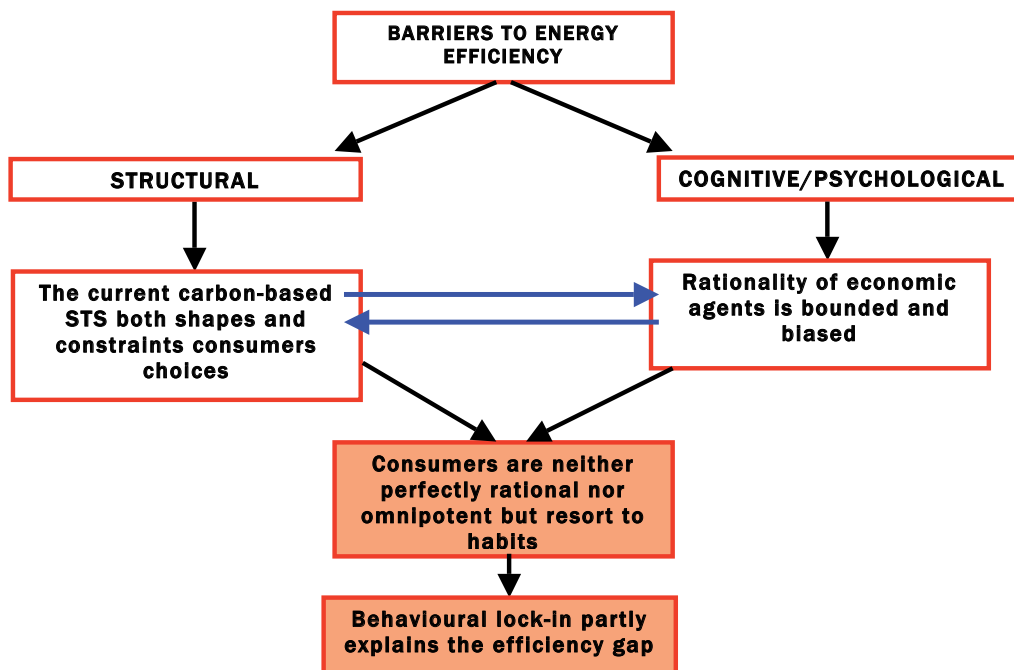


Figure 1. Complementary explanation for the existence of the “efficiency paradox” in energy

is wedged between the traditional micro and macro scales. What is interesting about the meso scale is that it highlights the role played by interdependencies of systems elements and the emergent nature of economic change. It thus provides an alternative to simple aggregation (i.e. the “representative agent” hypothesis on which the traditional framework of “general equilibrium” rests) by building “on the notion of circularity between individual and population” Dopfer (2006, p.18)³. As shown in Maréchal (2007), integrating meso dynamics clearly provide an interesting level of analysis in energy-related studies so much that they have been claimed to be the “missing link” of this field by Schenk et al. (2007).

The rest of the paper is structured as follows. The next section provides a tentative definition of habits building on the insights provided by analyses in social psychology, sociology and evolutionary economics. Section 2 also serves to discuss the prominent features of habits. Based on that definition and the identified characteristics of habits, the third section presents empirical elements to better understand the role played by habits in consumption dynamics in the specific area of domestic energy. Section 4 then concludes with a discussion and some policy recommendations.

What are habits?

In order to shed an insightful complementary light on policy-making in the field of energy consumption through showing the crucial role played by habits, it is necessary to first provide a clear definition of what they are exactly. Looking for a characterisation of habits in a way that allows for both the evolution of structures and individuals to be understood, it appears interesting to turn to the insights from the Veblenian tradition

which considers behaviours as embedded in a wider social context through corresponding habits. This can be illustrated by the following quote “At the same time men’s present habits of thought which tend to persist indefinitely, except as circumstances enforce a change. These institutions which have so been handed down, these habits of thought, point of view, mental attitudes and aptitudes, or what not, are therefore themselves a conservative factor. This is the factor of social inertia, psychological inertia, conservatism” (Veblen 1899: 190-191).

The importance of habits in the Veblenian tradition of institutionalist theory⁴ is to be put in parallel with the more recent works in social psychology where a substantial body of literature has shown that – more often than not – our behaviour is guided by habits and thus without the type of cognitive deliberation and consciousness assumed in the rational choice model (Verplanken et al., 1998; Lindbladh and Lyttkens, 2002; Chartrand, 2005; Dijksterhuis et al. 2005; Verplanken and Wood, 2006; Ji Song and Wood, 2007). The obvious advantage of adopting this kind of “habits” in decision-making is that it frees up resources that can be devoted to solving non routine-like problems. An empirical study performed by Wood et al. (2002) has clearly demonstrated that people have thoughts unrelated to the task at hand when performing a habit while the thoughts they have when performing a non-habitual form of behaviour are connected with the task.

At this stage, it is crucial to provide a tentative definition of the concept of habits in order to see whether the insights from social psychology and institutional theory are compatible. Borrowing directly from the work of Veblen, James and Dewey, Hodgson (2007: 106) sees habits as “submerged repertoires of potential thought or behaviour to be triggered by an appropriate stimulus and context”. This definition is further complemented

3. In other words, dynamics involve processes that see individuals interacting with an emergent population in a self-reinforcing manner.

4. The work of Bourdieu and his concept of *habitus* is obviously also worth mentioning but it is beyond the scope of this paper.

with two essential elements: habits are often “unconscious” and different from actual behaviour as they only are an “acquired predisposition” (Hodgson (2007: 106)).

Within the field of social psychology, an often quoted definition is the one provided in Verplanken and Aarts (1999: 104), where habits are viewed as “learned sequences of acts that have become automatic responses to specific cues and are functional in obtaining certain goals or end states”. In a more recent paper, Wood and Neal (2007: 843) complement the definition with respect to goals by underlining that “habits are subserved by a form of automaticity that involves the direct association between a context and a response but that interfaces with goals during learning and performance”.

It follows from those two definitions that habits can be characterised as a context-dependent form of acquired automaticity. However, this automaticity is somewhat limited (i.e. behaviour is only “potential”) by a required functionality or correspondence with objectives. As already mentioned in a previous paper (Maréchal, 2009), the crucial feature that characterises a habit is not its repetitive nature but the degree to which it has become automatic. This is in line both with Verplanken (2006: 639) who considers that “whereas repetition is a necessary condition for a habit to develop (...) it is not repetition *per se* that matters” and with Hodgson (2007, p.106) who claims that “(r)epeated behaviour is important in establishing a habit. But habit and behaviour are not the same”.

To put it more precisely, the main feature of habit is “the automatic elicitation of behaviour upon encountering specific cues” (Verplanken and Orbell, 2003: 1317). This situation/behaviour association is often referred to as a cognitive script which can thus be viewed as the knowledge structure behind the habits (Jager, 2003). In sum, provided that a habit has been formed through the satisfactory repetition of a given behaviour and that the goal associated with that habit is activated⁵, the presence of the specific cue automatically triggers the habitual behaviour.

However, acknowledging the third principle that ensues from the aforementioned definition provided in Wood and Neal (2007), this is only valid as long as a conflicting goal-habit interaction does not result in people exerting control over their triggered habits. Although automaticity is regarded as the main feature of habits, it is of crucial importance to note that “(h)abit is not mere automatic behaviour; that mistake reproduces the Cartesian dualism of thought and machine. Even the most ingrained habits are the objects of recurring mental activity and evaluation” (Hodgson, 1993: 229). Indeed, highlighting the role that habits play in mediating behaviour does not mean that there is no room left for controlled or deliberate processes in the causal factors of behaviour. In fact, since habits are acquired and learned, they originally require deliberation as free will is essential to memorization⁶. The often quoted “driving metaphor” indeed perfectly illustrates that even though experienced drivers are able to change gears without having to think about

it, this cognitive automatism was “acquired through a long learning process in which motivation plays a far from negligible role” (Lazaric, 2008, p.3). In fact, as noted in Wood and Neal (2007, p.850), “the habit-goal interface is constrained by the particular manner in which habits are learned and represented in memory”.

It quickly appears that the trickiest feature of habits – both from a research and policy perspective – is undoubtedly the extent of their unconsciousness. Although they do not require much intentional effort to be set in motion, habits should not be assimilated to pure reflexes as they are “based in part on the ability of the individual to learn or acquire/absorb the particular behaviour into a cognitive schemata or script” (Limayen et al., 2001: 277).

Still, the low degree of consciousness that characterises many habits is essential to take into account since it may explain why people often underestimate the importance of habits as a potential obstacle to a change of behaviour. This can be illustrated by the preliminary results of the CLEVER project (Englert et al., 2009). This is a study on “The barriers to the adoption of alternative vehicles” undertaken in our research centre and within which it has been possible to include questions to assess the importance of habits. The first phase of this study consisted in a questionnaire that was submitted to the people visiting the “Brussels Motor Show”. The analysis is based on 263 respondents who were asked to grade a set of pre-established barriers to the adoption of alternative vehicles on a scale ranging from 0 (“not a barrier”) to 10 (“a very important barrier”). As expected given the aforementioned problem of low consciousness, “the necessity to change existing habits” is not considered as an important obstacle. As shown on figure 2, it only gets half the score of the most important perceived barrier (i.e. lack of infrastructures).

This apparently low importance of habits that is reported by individuals is to put in contrast with two other elements. The first is the fact that, among the 106 persons (40 %) of the sample who claimed that they would be ready to buy an alternative vehicle, the preferred technology is the hybrid vehicle as shown in the figure 3⁷.

This is somewhat contradicting since it is both much more expensive (i.e. and “price” is considered as the second most important barrier) and newer than, for instance, vehicles using Liquefied Petroleum Gas (LPG) which have been available on the market for a quite long time (i.e. at least the possibility to transform conventional vehicles). From the few responses people mention in open questions, it appears that the hybrid technology is preferred over others because it is perceived as not entailing any changes. This is in line with the second element of the study that comes from the “by technology” part of the questionnaire which consisted in a set of open questions. For both LPG and Compressed Natural Gas (CNG) vehicles, psychological barriers (mostly relating to people’s reluctance to change towards a new type of vehicle and its allegedly most dangerous nature) is the second most often cited reason for people not adopting those technologies⁸.

5. The functionality (or the goal-directed nature) of habits is important as shown in Ouellette and Wood (1998).

6. As shown by Bargh (1997). It is also important to note that social processes like imitation and conformism are involved in habit forming (Hodgson, 2004: 652). This is in line with Jager (2003) where it is mentioned that the initial performance of behaviour before it becomes a habit forming is deliberation, learning from peers or imitation of successful behaviour.

7. Note that this figure is based on only 68 responses since 38 individuals could not specify their preferred class of alternative vehicles.

8. For LPG, the most important barriers are the technical ones whereas for CNG it is the supply-related ones (i.e. mostly the lack of recharging infrastructures).

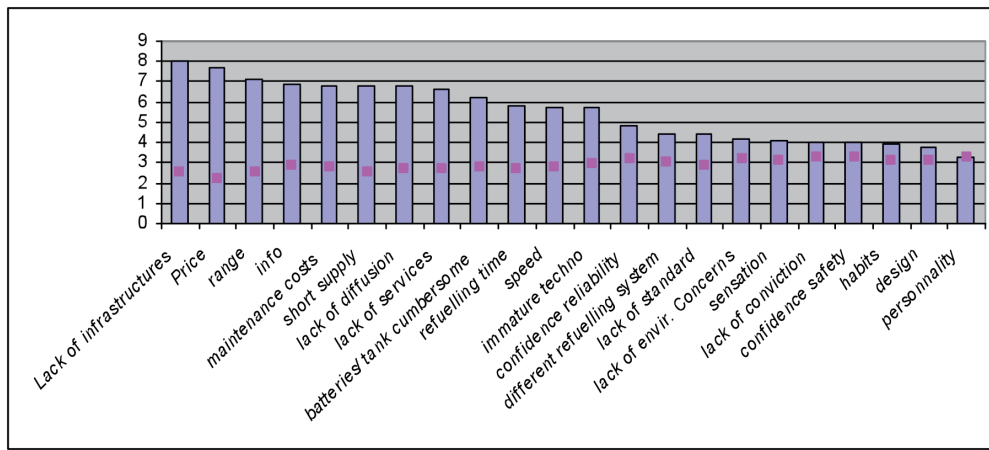


Figure 2. Perceived importance of different barriers to the adoption of alternative vehicles (n=263; source: Englert et al. 2009)

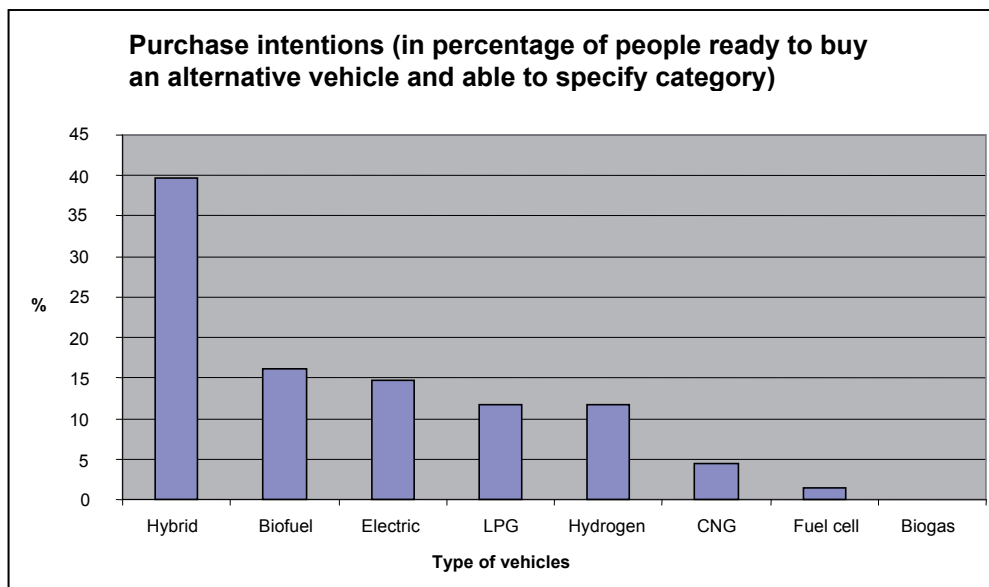


Figure 3. Purchase intentions of alternative vehicles (n=108; source: Englert et al. 2009)

Interestingly, psychological barriers are also very important for explaining people’s reluctance towards hydrogen vehicles but they are not mentioned at all neither for hybrid vehicles nor for agro-fuels vehicles. There is thus a clear “stick with what we’ve got (and know)” tendency. This would suggest that the need to change habits increasingly appears as a problematic issue when people are asked more concretely the reasons why they do not want to adopt a given technology. Still, this is only inferred implicitly from the answers but not recognised directly. This is corroborated by the second phase of the study which consisted in a set of 15 thorough qualitative interviews in each of the three following groups: supply stakeholders, experts and fleet managers⁹. In almost all interviews, the issue

of changing consumer’s habits appears to be an important obstacle impeding the wider diffusion of alternative vehicles. Interestingly, fleet managers themselves seem somewhat locked-in their usual practices as they often claimed that they would rather buy smaller cars using existing technologies than turn to alternative vehicles in order to lower their contribution to greenhouse gas emissions. Supply-side actors also claimed that the “near future lies in improving extant technologies rather than in creating new ones”.

There are reasons to suspect this underestimation of the role that habits play in preventing behavioural change to also be of importance in domestic energy consumption. This can be illustrated through looking at the responses provided by the people that took part in the first two editions of the Brussels Energy Challenge. This is an initiative launched by the regional authorities that invites people to commit themselves – on a voluntary basis – to reduce their energy consumption through implementing at least one of the proposed energy-efficient measures. Information, feedbacks, group meetings and monitoring are also offered to the participants. What is interesting for the purpose of this paper is that, in the first two editions of the

9. The supply-side stakeholders were selected to be representative of both all the different types of alternative vehicles currently available (Prius, Areva, etc.) as well as of those car companies not selling any such vehicles. The experts were chosen among NGO’s, political parties, universities and research centres. As far as the fleet managers are concerned, the persons interviewed were selected to cover the full range of entities with a fleet of vehicles (taxi companies, municipal districts, public administrations, police departments, etc.). The interviews were performed between February and June 2008. They consisted of “face-to-face” interviews for the first two groups, while fleet managers were interviewed by phone.

Table 1. Perceived importance of habits in domestic energy consumption

Questions (i.e. answers on a scale ranging from 1 to 10)	Average	Proportion of weak habits (i.e. less than 6)
Do you think that your daily behaviour concerning the use of <u>electricity</u> (lighting, electric appliance, etc.) are guided by habits, automatisms?	7.28	20.43%
And what about your daily behaviour concerning the use of <u>heating</u> ?	6.79	27.79%

Brussels Energy Challenge, people reported quite high values – 6.7/10 in 2006 and 6.94/10 in 2007 – concerning “their ease of learning new habits” (IBGE, 2007: 29)¹⁰. Thus, provided that habits do play a role in domestic energy consumption, it may well also be that individuals do not really see it as a problem since it is considered to be easily changed¹¹.

In our perspective, the next step is thus to assess the role of habits in influencing energy consumption behaviours. To start with, it seems obvious that behaviours such as switching off the lights or turning off appliances (i.e. “curtailment behaviours” in the sense of Gardner and Stern, 2002) meet the three conditions identified in Jackson (2005: 64) for the balance of the decision-making process to swing away from cognitive effort and towards automaticity: low degree of involvement, low perceived complexity and high degree of constraint. Indeed, the decisions taken in everyday energy consumption are likely to be considered as having less important consequences than other decisions. According to the work of Amos Tversky, people are more likely to use simple heuristics (such as habits) in such situations. Needless to say, the low complexity of decision tasks related to everyday energy consumption does not require a lot of cognitive effort either. Finally, the constraints of today’s society and the feeling of time pressure as well as the information overload that characterise it tend to favour the use of habits which provide a feeling of enhanced comfort (Lindbladh and Lyttkens, 2002). One other important element that characterises domestic energy consumption is that it is not visible (Jackson 2005; Abrahamse et al. 2005). This implies that people do not consider the remote environmental impacts of their actions when performing energy-related behaviours. This obviously facilitates having unsustainable habits in this field (Martiskainen 2008, 77).

All together, this suggests that everyday energy-related behaviours do not require much intentional effort to be set in motion such as it has been shown to the case of, for example, food consumption of adolescents in Kremers et al. (2007). This is corroborated by a review of studies on domestic energy consumption where one of the lessons learnt is that the importance of habits can “prevent that (pro-environmental) behaviour from happening” and make a person “act opposite to his or her intentions without even realising it” (Martiskainen 2008, 87).

However, beyond all these elements and the acknowledgement by experts in the field of habits such as Schäfer and Bamberg (2008: 213) who consider that energy use along with nutrition and mobility are “highly ritualised forms of behaviour that are hardly reflected upon in everyday life”, we are still left with not much empirical evidence of the importance of habits in domestic energy consumption¹². This is why we took the opportunity of the third edition of the Brussels “Energy Challenge” to include two broad questions on habits within the questionnaire submitted to the participants. This questionnaire is filled by the participant when he registers for the Brussels “Energy Challenge”. The analysis is based on the data provided by 372 respondents which were collected in November 2008. The results are summarised in Table 1.

These results thus tend to support the idea that energy consumption behaviour in houses is indeed perceived as being guided by habits (i.e. whether good or bad) and not much reflected upon. Based on our experience in this field, it was also expected that people would likely consider heating-related behaviour (such as setting the level of the thermostat) as less automatised than electricity-related ones (such as switching off the lights). This seems to be confirmed by our study but only to a low extent that is not statistically significant.

However, given the aforementioned problem that arises from the unconscious nature of habits that often make people underestimate their importance as a problem, it may appear questionable to measure the strength of habits by means of self-report (Danner et al., 2008: 263). Accordingly, it is crucial to provide an answer to this inevitable issue raised by, among others, Klockner et al. (2003: 400) who consider inappropriate “to ask people to report the strength of their habits when an essential feature of habit is its unconscious character”. There are two elements to bear in mind in order to deal with this important issue. First, it must be noted that the essential feature of habits is their automatic nature and not their unconscious character. Lack of awareness is only one of the four features of automaticity and is thus sufficient but not necessary for a process to be qualified as automatic (Maréchal, 2009). Second, in line with Chartrand (2005), it seems appropriate to start with setting a clear distinction between the different stages at which awareness may operate: the environmental cues, the process by which these cues influence behaviour and the outcome of that process. Dijksterhuis and Smith (2005: 226) claimed that while we are usually aware of the outcome and sometimes aware of the cues, we are usually not aware of the process. Following that line of

10. The complete results can be found in the June 2007 Report (in French) on www.defi-energie.be.

11. The answers might be biased by the overrepresentation of households with higher level of education in the first two editions of the Brussels Energy Challenge. It has been shown in Bartiaux (2007, p.95) that people with higher level of education tend to sort more their waste than others in the case of weak pressure. There probably is a sort of positioning effect of showing that one is not trapped in his habits and can easily adopt a new behaviour.

12. An exception is, for instance, the recent work of Gram-Hansen (2008c) on stand-by consumption where she discusses the role of embodied habits in connection with technologies.

thought, many consumption choices are thus “introspectively almost blank” (Dijksterhuis et al., 2005: 193) with respect to behavioural details but, at the same time, consumers are nonetheless aware of their action in a broad sense (Dijksterhuis and Smith, 2005: 226).

In sum, whereas consumers certainly do not have access to many automatic and tacit processes, they are still able to report on the occurrence of some of these provided we touch on this “broad sense awareness” (i.e. if they are presented question in a meta-cognitive fashion that touches on the “learned sequences” part of habits). We are thus aware that we rely on habits even though we are not fully conscious of it when performing the habitual behaviour - this broad awareness being a distinguishable feature of habits as compared to fully automatic behaviours such as reflexes. For instance, building on the example of grocery shopping described in Dijksterhuis et al. (2005: 193), consumers may have picked most items that end up in their cart with nothing more than “a fleeting moment of awareness” and thus have no memory of making those choices, but they would still be able to realize (and report) afterwards that they have not been thinking about those decisions when “making” it. This ability is even facilitated when “the concept of habits is broken into components that seem easy to reflect on” (Verplanken and Orbell, 2003: 1 325).

Furthermore, making individuals report on their personal habits might be a first step towards bringing knowledge from practical to discursive consciousness¹³ – which has been shown to be a necessary condition for changing habits (Bartiaux, 2008). This seems intuitive since habits are thought to be “acquired through a process in which repetition incrementally tunes cognitive processors in procedural memory” (Neal and al., 2006, p.198). In fact, bringing information from procedural (or practical) to declarative (or discursive) memory could be conceived as a step backwards (or as going back to the source) since the declarative stage (i.e. the cognitive processing of information in memory) is the first stage of habit formation which ends up with the procedural stage (Jager, 2003). This idea that we are not fully aware of the process fits with the aforementioned problem of underestimation which also suggest that making people realise and express that they do something by the force of habits is a necessary first step.

Their dependence on context stability: the vulnerability of habits

Even though deeply ingrained habits can be strong enough to counter intentions in determining behaviours, their context-dependent automaticity offers a way forward for changing them. Indeed, while their automaticity partly explain this predominance of habits over more deliberate thoughts (i.e. which come later to mind), their dependence on contextual cues also provide an important point of vulnerability (Verplanken and Wood, 2006: 91).

Along with repetition, context stability is a necessary condition for habit to develop (Danner et al. 2008). This led many habits experts to suggest that changing the circumstances tied to the formation of a habit would make that same habit more open to change (Wood et al., 2005; Verplanken and Wood, 2006). Based on this idea, several studies have shown that the sensitivity towards making changes of daily habits increases during the phases of changing circumstances such as relocation, retirement or the birth of a child (Schäfer and Bamberg, 2008). Such naturally occurring changes of context do not make habits change neither automatically nor directly but they are better viewed as “windows of opportunity”. That is the reason why they have been studied from the perspective of their interaction with a complementary measure. This is what Verplanken and Wood (2006: 96) call the “downstream-plus-context-change interventions”. The effectiveness of linking sustainable measures to sensitive life events or changes of context (e.g. the temporary closure of a freeway) has been tested empirically in several studies (Satoshi and Gärling, 2003; Verplanken et al., 2008; Bamberg, 2006; Bamberg, 2007).

However, most of these studies deal with car use habits and not specifically with energy consumption. Moreover, they only provide strong empirical evidence that, among two groups of recent movers, those that are targeted with the information campaign or the incentive (i.e. a free bus pass) do reduce their car use habit to a greater extent. Those studies thus highlight an “amplifying effect” of the campaign with respect to the behavioural change triggered by the new context (Bamberg, 2007: 368).

As far as domestic energy consumption is concerned, physical location is obviously an important environmental cue in generating habits (Maréchal, 2009). Based on the aforementioned evidence and given the role played by strong habits in biasing information search (Verplanken and Wood, 2006), incentives aimed at improving energy efficiency would probably be more effective if supporting information was specifically targeted towards new residents (whose previously-determined habits have been perturbed with the change of physical location) than they would be among the population of incumbent residents. This is supported by the evidence contained in Wood et al. (2005) that shows how a change of location would induce decisions to be more in line with intentions than with habits. The idea would thus be to explore the effectiveness of a given energy efficiency measure among two groups: the recently moved and the not recently moved.

Accordingly, we formulated the hypothesis that the energy subsidies offered by the Brussels Region (i.e. for insulation investments, the purchase of energy-efficient appliances, etc.) would be more successful among people that recently moved than among the incumbent residents even though recent movers are not more specifically targeted by the measure. Such a difference of receptivity would suggest an increased openness to new information coming from a perturbation of existing habits triggered by the change of physical context.

To do so, the complete database for the year 2007 was collected from the institution in charge of the management of that measure (i.e. SIBELGA). It contains all the subsidies that have been granted in 2007 (i.e. the most recent compiled data available), that is a sample of 14 348 requests with the name

13. This distinction – that is borrowed from the work of Anthony Giddens – is similar to the difference between “procedural” and “declarative” memory expressed in Lazaric (2008). However, discursive knowledge is probably less focused on cognitive aspects than on the social dimension. The opposite is true for “declarative” memory. This is likely due to the discipline where both concepts evolved.

Table 2. Proportion of “newcomers” in the sub-samples and in their corresponding districts

District INS code	Population	Newcomers-sub	Newcomers-tot	Variation in %
21 002	29 552	28.73	26.8	+7.20
21 005	41 740	44.41	35.7	+24.40
21 008	20 970	29.29	27.7	+5.74
21 012	79 877	39.43	29.2	+35.03
21 013	44 265	51.34	33.8	+51.89
21014	23 557	47.15	33.1	+42.45
21015	111 946	41.16	28.6	+43.92
21016	75 954	33.3	26	+28.08
21017	24 056	29.53	21.8	+35.46
21018	47 952	35.47	28.9	+22.73
21 019	38 232	34.32	27.9	+23.01

Source: Belgian National Institute of Statistics (INS); Sanderson (2008); own calculation

and address of the applicants and the type of energy-efficient measures for which the subsidy was requested. Sub-samples could then be created for each of the 19 municipal districts of the Brussels Region. This step was needed because these sub-samples were then sent to the corresponding municipal population departments which are the competent bodies for statistics on registration dates. These departments were thus asked to provide us with the dates at which the applicants for energy subsidies registered at the address mentioned in the database. Given that this time-demanding task was to be performed on a voluntary basis by municipal civil servants, we expected only a few responses but we received completed files from 11 districts for a total of 8 279 granted subsidies (i.e. 57.7%).

Given the time that is needed for a subsidy request file to be completed and for the whole administrative process to be fulfilled, it was decided to consider people registered in 2004 or later as the recently moved¹⁴. The next step was thus to compare, for each of the 11 municipal sub-sample, the proportion of newcomers with the same proportion in the total population of the corresponding municipal district for the year 2007. The problem is that municipal proportions could not be provided by the districts themselves as this data does not exist as such but must be calculated. Fortunately, this work was being done by a consortium of demographers (see Sanderson, 2008) that was able to provide us with that proportion but only for 2006 (i.e. people arrived in 2003 or later and still living in the given district in proportion of the total population in 2006).

As shown in Table 2, for each municipal district, the proportion of newcomers in the energy subsidies sub-samples is higher than the corresponding proportion (i.e. Newcomers-tot) in the total population. The variation ranges from 5 to more than 50% while the weighted proportion of newcomers for the whole sample is 36.19%, that is a variation of +28% with respect

to the weighted proportion of “newcomers-tot” (i.e. 28.14%)¹⁵. This would suggest that a change of physical location (and the change of social surroundings that goes along with it) does indeed make people more sensitive to the information related to a given measure up to the point that they use it more. However, at this stage, this can only be a conjecture since, except the aforementioned proven biased information-search process displayed by people with strong habits (i.e. they search less and their search is biased toward confirming habitual options), there are no elements that allows for a causal explanation to be determined. For instance, it could also be that the higher proportion of newcomers in the subsidies samples is explained by the owner-occupier issue. Indeed, the Brussels region is characterised by a high proportion of tenants who can not decide to better insulate their dwelling without the permission of their landlords. So, it is only when you become a new landlord that you can start applying for such subsidies. Furthermore, it seems easier to undertake such works while you are in the process of moving (and often renovating) than once you are settled in your house for a long time. However, this “opportunity” effect could be viewed as a habit-based issue as profitable energy-efficient investments are not less efficient because you have been living in the same house for a long time.

Still, these two elements could also provide a sound explanation for the results displayed in table 2. To verify this hypothesis, we proceeded to a different categorisation of the complete database using the type of subsidies requested. Unfortunately, only 9 sub-samples could be used since the data related to the type of subsidies were missing for two districts. This led to a “by category” database consisting of 6 051 requests. This change only slightly affected the proportion of newcomers from the

14. This does not have an impact on the results.

15. Note that these weighted proportions are based on the respective importance of each district in the total sample of 8 279. This weighted proportion does not differ widely from the ones obtained using the importance of each district population in reality (resp. 38.49% and 29.04%). Thus, the fact that our database is not perfectly representative of the respective population of each of the 11 districts is not a strong bias.

Table 3. Proportion of “newcomers” and incumbent by type of subsidies

Type of subsidies	Newcomers	Incumbent	Total
Heat production	544 (24%)	1 174 (31%)	1 718 (28.4%)
Appliances	1 110 (49%)	1 437 (38%)	2 547 (42.1 %)
Shell/insulation	611 (27%)	1 175 (31%)	1 786 (29.5%)
Total	2 265 (100%)	3 786 (100%)	6 051 (100%)

original 36.12% up to 37.47%. Based on statistical considerations for sample size and on objective criteria (i.e. such as time of duration, need for maintenance or investment costs), the 18 types of subsidies were grouped into three categories: “shell/insulation”, “heat production” and “appliances”. If the above-mentioned “opportunity” and “owner-occupier” issues were significant, the proportion of newcomers would be overly represented in the “shell/insulation” category.

However, as shown in table 3, the difference between categories is significant and the proportion of newcomers is overly represented in the “appliance” category ($\chi^2 = 73.42$; $df = 2$; $p < 0.001$). This would suggest that the “habits-disturbed-due-to-context-change” explanation is more important than both the “opportunity” and “owner-occupier” issues which are less salient for the purchase of electric appliances.

General discussion and policy recommendations

As expected, the empirical results discussed above support the idea that habits do mediate the intention-behaviour relationship in the field of domestic energy consumption. More specifically it tends to confirm that the presence of strong habits can explain the low effectiveness of traditional measures such as incentives (Maréchal, 2009). It then seems straightforward that policy-makers should specifically address the performance context of habits in order for measures aiming at a reduction of domestic energy consumption to be effective.

As mentioned in introduction, it is acknowledged that technical and wider societal influences do clearly matter. Indeed, a large part of the increase of energy consumption is due both to the fact that many people can be considered as locked-in to poorly built and inefficient houses and to general cultural and technical developments (Martiskäinen, 2007: 27). Still, the interplay of the larger carbon-based STS with habits is essential to grasp both because habits enable it to hold together but also because different habits may explain the divergence of consumption patterns observed between households living in similar conditions (Gram-Hanssen, 2008). Stand-by consumption is a good illustration of the interaction between technological change and habits. Designing measures to change energy-consuming habits appears inevitable. Micro-level interventions are thus needed as much as macro-level ones since, due to the potential rebound effect arising from unchanged energy-consuming habits, “an exogenous increase in energy efficiency may not lead to lower energy consumption” (Brännlund et al., 2007: 15).

The role of habits may explain why some measures have proven more successful than others. From the more detailed discussion on the process of habits reinforcement provided

in Maréchal (2009), the joint use of feedback and social commitment measures appears as promising. This is confirmed by three review studies that assess the effectiveness of measures aimed at reducing energy consumption (Abrahamse et al., 2005; Darby, 2006; Martiskäinen, 2007). From the habits perspective, the potentially greater effectiveness of combining “consequence measures” such as feedbacks with social influences stems from the fact that they address two prominent aspects of habits reinforcement: biased information and remote long-term benefits attached to the alternative behaviour as compared to habits. Indeed, feedbacks are intended to inform and motivate through increasing visibility (Fischer, 2007: 503) while commitments strategies (i.e. such as the Brussels Energy Challenge) enhances “self-satisfaction as a result of acting in accordance with personal values” and therefore increases “the cost of not acting” (Matthies et al., 2006: 94). Adding social or comparative components to such commitment measures seems to further increase their effectiveness as illustrated by the comparative feedback case in Siero et al (1996) and the social commitment case of the Dutch “Ecoteam Programme” mentioned in Martiskäinen (2007: 44).

Summing up the elements arising from a review study, Martiskäinen (2007: 47) concludes that effective measures to reduce energy consumption should ideally be clear and simple, relevant to the consumer, involve some type of commitment or goal and be visible, consistent and frequent. This is in line with most of the policy recommendations mentioned in Maréchal (2009) and which are based on a detailed analysis of the characteristics of habits. Focusing specifically on feedbacks, Fischer (2007: 513-514) arrives at mostly the same conclusions but adds that feedbacks also should involve interaction and choice for households and be appliance-specific. However, one sound conclusion is made right after, underlining that “(t)here is probably not “the” perfect feedback for everybody”. While this is certainly true when it comes to the specific designs of feedbacks (i.e. table vs charts), it is also the case of feedbacks themselves since they turn out to be counterproductive for households with low consumption. More generally, there is no “one size fits all” measure and effective interventions should thus be tailored to the characteristics of the targeted group (e.g. norms and motives, consumption profiles, etc.). This argument is also essential to bear in mind for deconstructing habits. In accordance with our empirical results relative to the importance of context change (i.e. see table 2 and 3), McMakin et al. (2002: 851) claimed that “highly mobile populations (military, students) may adopt different energy use habits than those who stay in their residences for years. Thus, effective intervention efforts should explicitly include the characteristics of the targeted

living situation and its residents". This was already acknowledged in Veblen (1899: 108) where it is mentioned the "varying degrees of ease with which different habits are formed by different persons, as well as the varying degrees of reluctance with which different habits are given up". This variability of habits within a similar carbon-based STS shaping individuals towards energy-consuming behaviours is probably one reason why "many studies have shown that a combination of strategies is generally more effective than applying one single strategy" (Abrahamse et al., 2005: 282).

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