# Progress through Feedback – An Internet-based Personalised Monitoring System of Consumption Induced Greenhouse Gas Emissions with Rewards for the Goodies

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## Introduction

Consumers are expected to take on a bigger role in upcoming greenhouse gas (GHG) emission reduction strategies, because of tightening emission reduction objectives and the importance of private consumption for the GHG emissions of nations (e.g. for Finland see Seppälä et al., 2009). An increasing number of consumers both in Finland and elsewhere is concerned about climate change, and consumers have stated that they are willing to change their consumption patterns and habits, at least to some extent, with the aim to reduce emissions (e.g. OECD, 2008). However, the actual behaviour of consumers shows that by and large environmentally inspired changes in consumption patterns so far do not amount to anything substantial.

Traditional consumption-side instruments, such as emission and fuel taxes, may have limited effects, either because the price signal does not effectively reach the consumer of the final product, or other considerations dominate the decision making (Geller and Attali, 2005; Parry and Williams, 1999). In addition, studies indicate that although consumers are, in general, very favourable towards the environmental information, it often has only a little effect on their purchase decisions (e.g. McKenzie-Mohr, 2000; Leire and Thidell, 2005; Schmidt and Poulsen, 2007; Aalto et al., 2008). A prerequisite for utilising information in consumption choices seems to be an extensive interest in environmental aspects (e.g. Leire and Thidell, 2005; Valor, 2008). Therefore, there is a need for new instruments and approaches that go beyond the current options of policies.

In recent years, in many countries, experiments have been carried out regarding the development of personal or household level carbon credit systems with the aim to reduce GHG emissions (e.g. Seyfang, 2007; Defra, 2008; Perrels et al., 2009). Research indicates that positive feedback, such as bonuses, is in principle more effective than negative feedback such as sanctions and taxes (e.g. Andreoni, 1994), notably in less clear choice situations.

This paper draws heavily on literature research and empirical testing of the demonstration version of the monitoring and feedback system done in the Climate Bonus project, which is carried out by a team drawn from five Finnish research institutes[1]. The key purpose of the whole project is to assess the possibilities and effectiveness of a combined monitoring and feedback system for households, which would motivate them to consume in such a way that GHG emissions are reduced and which would motivate retailers to offer a product range that advances the choice of low GHG solutions for households.

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In this paper, we examine the monitoring and feedback system from the consumer's point of view. The discussion leans heavily on a pilot held among 35 consumers during the Climate Bonus project. In particular, we are interested in the possibilities of motivating changes in consumer behaviour with the aim to reduce the embodied emissions of household consumption. We study consumers' experiences and evaluation of the system with the aim to infer whether such systems, in principle, can promote the desired behaviour and what features in the design and services provided seem to affect the actual responsiveness and continuation of interest of consumers. The issues that receive special attention are attractiveness, usability, usefulness, and acceptability of the system. In order to gain experience-based user feedback consumers are involved in the innovation process of the system.

In the following, we first give an overview of the theoretical background of the study. Next, we describe the demonstration version of the monitoring and feedback system, and the design of the pilot study. Then, we present the feedback gained from consumers as well as some conclusions.

## Theoretical background

The theoretical concepts of the study are based on the literature on user involvement in the product development process, and on the adoption of new consumption pattern and habits.

*Involving users in the product development*

User involvement in the product development process is topical in several disciplins and fields of practice. Many studies show that user involvement can produce useful information about users' needs and values into the innovation processes of poducts and services (e.g. Rocracher 2003; Kujala 2008).

There are a number of research methods to involve users. Alongside traditional methods such as surveys and focus group discussions, several new methods are being continyally developed and tested, such as the lead user method, contextual design and participatory design. A key feature in all of them is the intensified interaction between the product developers and users. (e.g. Kaulio, 1998; Kujala, 2003).

Users may enter the product development process in different stages. The design of products can be influenced more in the early stages of product development, but on the other hand, users may find it difficult to come up with concrete propositions unless they have previous experiences of using similar products. User experience seems to be a critical prerequisite for succesful user involvement (Engelbrektsson, 2002; Mooy and Robben, 2002; Shih and Venkatesh, 2004; Haddon, 2005).

Adequate representation of users is an important issue, when product development includes user involvement. Substantive issues are, for example, when we should involve expert users (e.g. lead users), and when we should include ordinary or lay people. One topical issue is whether users are capable of providing useful information in the product development. It is often been noted that users may find it difficult to verbalize their needs (von Hippel, 1988), or they may be unaware of their own requirements (Riquelme, 2001). Furhermore, it is not always clear how the user feedback is converted into practical design solution. Integrating user information with the product development process is, thus, a challenging task (e.g. Kujala, 2003; Heiskanen and Repo, 2007).

By involving users in the innovation process of the monitoring and feedback service we also aimed to gain user experience-based knowledge about the acceptability of the service and its effects on consumer behaviour.

*Adoption of new consumption patterns and habits*

The acceptability and adoption of new technologies, and the factors affecting them has been studied in several disciplines, using various theories and approaches. For instance, according to the widely used Technology Acceptance Model (TAM) ease of use and usefulness are the most important determinants of user acceptance of a new technology (Davis 1989).

In our study, we use the approach of appropriation of technology, which helps to understand how new technologies, such as the monitoring and feedback service, become integrated in everyday practices (cf. Mackay and Gillespie, 1992; Niva, 2008). Practical and conceptual appropriation of technology is a prerequisite to adopting a new technology. Practical appropriation includes using the technology, assessing its benefits and problems, and accomodating it to one's habits and everyday routines. At the same time, the technology is appropriated conceptually: it is made meaningful in one's life and it becomes a part of everyday thinking. Because consumers only have little practical experiences of the new technologies, they usually assess them through old products or services, and the concepts and properties related to them (Geels, 2005).

The concept of appropriation contains the presumption that consumers are active when adopting – or abandoning – new technologies (Lie and Sørensen, 1996; Niva, 2008). Adopting process requires motivation to learn new skills and knowlegde, as well as consideration of consequences of one's choices. Several studies show that in adopting a new technology it is crucial that it brings along benefits compared to prior practises. The new product or service should be better than the old ones. Adopting new technologies usually is a slow and multi-stage process. With time, new commodities lose their "special nature", and become part of person's own system of commodities, and even part of his/her whole lifestyle (cf. Pantzar, 1997).

Habits play a prominent role in consumption behaviour (e.g. Bagozzi and Warshaw, 1990; Jackson, 2005). Various discplines have developed theories about habits. With respect to exogenous attempts to change consumer's behaviour a crucial feature of habits is their automatism. Choices are made without internal deliberation or evaluation, because past positive experiences have already corroborated these choices. Such automatisms are a rationalisation process, bacause one simply cannot ponder about every choice time and again, i.e. learning is very important. Already for this reason, habituation as a kind of self-protection, it is not so easy to actually reach the consumer. Furthermore, as habits are based on past, affirmative, experiences it is hard to make a consumer realise – and trust – that there is a better alternative available. Quite some changes in habits, such as in commuting, only get a chance to occur when a consumer is more or less forced to adapt. All in all, this means that repeated and prolonged exposure to alternatives and/or to information about setbacks of the current choice as compared to alternatives improves the chances for (intended) changes in habits. The exposure should, of course, not be unpleasant. This notion of prolonged exposure comes also forward in the monitoring and feedback sysem for consumers.

## Structure of the pilot

In the pilot we tested a demonstration version of an Internet-based GHG emission monitoring and feedback service for households that was developed in the Climate Bonus project. In the following, we first present the monitoring and feedback service, and then outline the design of the pilot study.

*Design of the monitoring and feedback user-interface*

The demonstration version of the monitoring and feedback service allows households to technically monitor their cumulative GHG emissions ($CO_2$-equivalents) at various levels of

aggregation of their purchases (i.e. four consumption sectors and product groups), and to compare scores or indicators with time windows and statistics based reference levels and those of a peer group (Figure 1). Because of the lack of eligible GHG data on most of the products and product groups, the demo version included rather rough, and in some cases even fictional estimates on a product group level, especially for foodstuffs. The participating consumers were aware of this; it was clearly stated in the service. In the future, one of the main challenges of the system is to get reliable information about products and product groups.

The more elaborately covered consumption categories are foodstuffs, energy use at home, as well as transport fuels (for one's own car) and public transport services, with special focus on foodstuffs. In addition, a category 'Other consumption' was included comprising of 18 expenditure categories. The system was also able to register and process emission off-set transactions (i.e. purchases of so-called carbon compensation services), and account for that in the net emission burden attributed to the consumption of the participating consumer. The tested system also included a simple reward system; so-called Climate bonus points were awarded on the basis of a reduction of calculated emission intensity of the cumulated purchases in comparison to a pre-assessed personal reference level ('business as usual level'). (Figure 1).

Regarding display of results in summary tables, monthly time windows were assumed to fit households' own monitoring purposes. Feedback information must be available in a sufficiently short period of time, otherwise consumers experience difficulties to link particular actions to particular results and, hence, the incitement for behavioural change may get spurious. Energy inputs for housing and the category 'Other consumption' were registered only on an annual level, but translated into amounts commensurate to the length of the cumulating monitoring period. Purchases (and emissions) in other consumption sectors were registered according to the date of purchase.

For this demo version automatic and "verified" activity data was received only for foodstuffs. A few key data per product, for example, the type of product and its weight, were automatically registered into the system by using a key card at the cash desk. To enable this procedure, the participants received a dedicated key card that could only be used in designated K-supermarkets.

The second route for activity data registration utilised product specific bar codes (EAN) of the product packages and the camera interface of a mobile phone or manual entry of the EAN-number using a computer. This route was capable of linking and registering "brand-specific" product information.

The third route was manual. Users registered their own activity data (e.g. kWh, litres, km, spent euros annually etc.) directly into the demo-interface. These data entries were designed in most cases to comply with the "billing boundaries" to make it easier for consumers to fill in details or estimate needed activity data.

Figure 1. Screen dump of the monitoring and feedback interface – the summary page (NB! the original version operated in Finnish)

It is important to note that only the first route to register consumer purchases enables the creation of automatic and verified monitoring capabilities. The reliability of other activity data depends more or less on the user and, thus, for the time being, the emissions of those product groups cannot be included in the bonus-incentive system (which, in principle, represents a kind of virtual money). However, the other data feed options enable the system to be more complete regarding the household's consumption, and, thereby, provide an overall, more sensible feedback at aggregate levels. Admittedly, this feature is sensitive to how accurate the participating households are with respect to their own data feeds.

*Design of the pilot study*

The pilot was planned and carried out in close co-operation with the research group and business partners of the Climate Bonus project, especially Ruokakesko Oy and Tuulia International Oy. Ten K-Supermarkets (food stores of the Ruokakesko chain in the pilot) in three areas were selected for the pilot (six from the Greater Helsinki area, three from Turku and one from Joensuu). Subsequently, consumers living (or sometimes working) within an acceptable distance of the selected K-supermarkets were recruited to take part in the pilot. 25

participants were recruited from the Consumer Panel operated by the National Consumer Research Centre in Finland. These consumers were living in the Greater Helsinki area and in Turku. Furthermore, another group of ten participants was recruited in Joensuu; they were regular customers of food stores of the Ruokakesko chain. All 35 consumers participated in the pilot on a voluntary basis. After the pilot, they were rewarded with a gift voucher.

The pilot for consumers was carried out from mid-January to mid-March 2009. It included three phases:

1. An online questionnaire concerning the characteristics of the participants, especially their purchase and consumption patterns and habits.

2. A trial of the demo version of the monitoring and feedback system for a period of four weeks (19 January - 15 February 2009)
   - Both a computer version and a mobile phone version were tested.
   - Participants were asked to concentrate their purchase of foodstuffs to those K-Supermarkets that were selected for the pilot. The product data was automatically registered into the system by using a key card at the cash desk.
   - In addition, they could enter foodstuffs bought from other shops, purchases of residential energy and motor fuels, public transport trips, as well as expenditures to other main consumption categories by themselves.
   - Participants were asked to follow the development of the cumulating emissions of the consumption of their households as displayed by the system, and, in two areas, also the accumulation of Climate bonus points. One group was excluded from the bonus option on purpose to get indications about a possible differential effect between 'just' monitoring and monitoring plus the bonus option.

3. The assessment of the monitoring and feedback system during and after the trial
   - Participants were asked to fill out two online questionnaires concerning their experiences of and views on the system and its effects. The first questionnaire focused on the participants' first experiences, and the second one covered all experiences of the system.
   - After the trial period, five focus group discussions were arranged (each group had different participants). They were employed to gain contextual data on the participants' experiences and views, and an in-depth understanding of the arguments underlying these viewpoints. Developers of the system were also present in the group discussions.

**Consumer experiences regarding the monitoring and feedback service**

The consumers who participated in the pilot tried out the different parts and functions of the demo version of the monitoring and feedback service, and evaluated its acceptability and the factors affecting it. In more detail, they gave feedback on its attractiveness, usability and usefulness. They used the service with a computer, and some also with a mobile phone.

*Interest in the idea of the service*

Almost all participating consumers found the idea of the monitoring and feedback service interesting after their first user experiences, and also after the whole trial period. They thought that it was an innovative idea that aims to tackle an important and topical issue. For some consumers, the service was initially a completely new phenomenon that they found thought-provoking and that awakened them to think about the climate impact of their consumption.

The more climate-aware consumers welcomed the idea of a new, concrete tool for monitoring emissions of households. Many saw a service like this as the only way for the individual to affect his/her behaviour. The idea was also praised for the potential it has to become a natural

part of the everyday consumption activities of ordinary people. It was considered a better channel for communicating climate information than separate sources of information, that are usually found only by enthusiasts. Because of this, the participants were confident that the service could succeed in creating a more profound interest in consumers in the climate impact of their consumption.

Some participants, however, were not that confident about the idea. They were concerned about the practical realisation of the service, especially as the role of commerce and industry was concerned. Some wondered whether it was sensible to get the report of the emission data only after the purchase. They thought the information of the climate impact of products should be available at the store before making the purchase decision. Some questioned the purpose of the whole service and its principles – and the whole current climate policy. They felt the project was "greenwashing".

*Usability*

Even though the consumers quite liked the idea of the created monitoring and feedback service, the practical realisation of the service that they tested was not received as enthusiastically. Its usability was evaluated as not so easy by most participants after the first user experiences, and also after the whole testing. Those consumers who found it easy to use emphasised its simple basic structure which made it easy to manage. Special praise was given to the automatic registration of foodstuffs purchased in K-supermarkets.

Almost all participants had encountered some difficulties in using the service. Some had faced functional and technical difficulties, such as problems with the registration or navigation on the websites. Registering purchase and expenditure data into the service proved problematic in many ways. Most of the critical comments were caused by manual registering of foodstuffs: except for foodstuffs purchased in K-supermarkets, the data had to be registered manually. This was described as difficult and laborious, in particular with a computer. On the other hand, the problem with manual registering was brought up also because many foodstuffs that were not purchased in K-supermarkets could not be registered at all. The system did not recognise all bar codes of these products. What also was irritating to the consumers was that it was not possible to register products that had no bar codes such as products bought directly from producers or at market halls. Many of these were found the ones whose GHG emission amount is small. Other sections suffered from some registering problems as well.

Some found it too challenging to search for information asked in various parts of the service. This concerned energy consumption data of 'Transport' and 'Housing' sections as well as acquiring expenditure data for the 'Other consumption' section. It was considered that one reason behind the problems with registering and searching for data was the fact that only one food store chain, a few shops, and no service providers participated in the pilot. In addition, for many, the shops were ones they would not have frequented ordinarily. These problems were seen as features that evidently reduce the willingness of consumers to use the service.

A lot of attention was also given to the intelligibility and presentation of information. The service contains abstract concepts and units of measure that are new to most ordinary people. These were presented to participants for the first time in connection to this pilot with the help of a technology-based service. Many participants did find the information difficult to understand. They said it would require much time and effort as well as further instructions to discern and comprehend the service. The general opinion was that the service was, as far as the information was concerned, meant for experts, not for average consumers.

The possibilities to use the service with a mobile phone were quite limited. Using the service with a mobile phone was considered more convenient in some respect than using it with a

computer. It was easy to browse products by "taking photos" of them with a phone. Consumers especially liked the feature that made product emission data available at the store and not after a couple of days, which was the case with the computer service. A mobile phone was also considered handy in registering products purchased from other stores than K-supermarkets.

*Usefulness*

For the future of the service, it is essential to know how useful the consumers find the service in their everyday lives. In their evaluations, they deliberated the benefits, and also problems, that using the service would bring them. For the user, an essential feature of the service is its ability and capability to inform about the GHG emission amounts of his/her household's consumption and to communicate information about the factors behind them sufficiently clearly and extensively.

Most of the participants found the service useful, at least to a certain extent, for their own household. After the whole trial period, more people found it useful than after the first user experiences. The service was found useful, because it provided information for evaluating one's own household's consumption as regards the climate impacts. For many participants, it was a true wake-up call to see their household's GHG emission amount. Using the service also motivated them to change their behaviour into a more climate-friendly one by making the consequences of their actions visible. The awareness that the service helped create made the testers realise that every consumer can affect the climate change with their choices. Especially many of those who, in participating in the pilot, had realised for the first time what an effect their consumer choices have on the climate were excited about the information offered.

Although the test period was short, using the service had motivated to change the purchase and consumption behaviour of some participants. The behavioural changes included for instance reducing the consumption of red meat, disposable products, energy and water, as well as increasing the amount of locally produced foodstuffs. Inspired by the pilot, one third of the households were planning to introduce some climate-friendly purchase and consumption manners in the near future. Examples of these were reducing the consumption of greenhouse vegetables, purchasing "green" electricity in the future, or using more environmentally friendly means of transport.

Some of the participants had, however, expected more of the service, and therefore were critical about it. They did not, for instance, consider the service very useful, because learning the idea and using the service were too laborious and demanding. Some were unhappy about the data content. They did not like the idea of the product group-based data – even if the data in the demo version was partly fictitious. This level of data did not correspond with the objectives the climate conscious consumers, in particular, had set for the service.

It was seen problematic that imprecise, i.e. product group level, information does not allow comparing products and brands, which makes it impossible to use the data for selecting specific products (amongst close substitutes). This kind of information was seen necessary as there is a significant amount of variation within product groups and within different brands of one product. In addition, the feedback provided by the service on household emissions monitoring were regarded as unreliable by some because of the inaccurate information database.

Some, on the other hand, regarded general knowledge would be sufficient for evaluating climate impact. A part of the participants thought the service would only be beneficial for a while, and that after learning the emission amounts of the products, they would not use it much. Some thought the feedback after purchasing was not important; the information should

be accessible before the purchase decision is made when one still has an opportunity to affect their choices.

When examining these results, it is important to consider that the real benefits, and also problems, cannot be distinguished or observed during such a short test period. Integrating an innovation into the people's everyday life usually is a slow and multi-stage process. These results may indicate, however, how a service like this would benefit its users.

## Prerequisites for acceptance of future emission monitoring and feedback services

The objective of the pilot study was not only to evaluate the demo version that was tested, but also to create a vision of the acceptability, prerequisites and conditions of a similar, complete emission monitoring and feedback services. The participating consumers were confident that a personalised emission monitoring and feedback service would be useful in the future. Most of them saw that a service like that could be in relatively broad use within the next ten years, and that they would be willing to use it themselves. They estimated, though, that the service would be used only occasionally rather than on a regular base. Furthermore, they believed that using the service could affect people's consumption behaviour. It could help people to reconsider their consumption, and thus change their consumption habits into a more climate friendly direction.

All participants agreed, however, that the demo version requires developing before the service can acquire a more extensive interest in the public. The most important prerequisites are that it would be free of charge, easy to use, and that it would include and offer reliable information. Personalised and experience eliciting elements were also wished. An essential prerequisite for the use would be what the participants brought up themselves: as many stores and service providers as possible should participate in the development work. In addition, it is interesting to notice that almost none of the participants said that, as a prerequisite for using the service, they would need to be rewarded for reducing emissions.

*Easy to use*

For many participants, the most important prerequisite was that the service shoud be easy to use. It should be simple enough, its structure and contents should be clear, designed according to the logic of the consumer, quick to use and functional. It should also suit all kinds of people, also those who do not use computers actively, for instance the elderly. The consumers expect that all purchases, especially foodstuffs, are registered into the system automatically.

The clarity and visual design of the service called for reshaping. The pages should be clear and they should be easy to navigate. A generous use of graphics and other visual material was expected, as well as entertainment elements and illustrative examples. It would be good to be able to familiarise oneself with the presented matters by means of images and links. For instance, such links could provide background information, including that of a scientific nature, on products.

*Reliability of the data*

Another important prerequisite for acceptance of future emission monitoring and feedback systems is the "right" kind of data content, such that would be reliable and suit the various household members. Participants' hopes of the data content were, however, rather complex and contradictory. Especially, their opinions differed on the accuracy level of emission data. Approximately half of them argued, that the complete service should include, as much as possible, brand-based emission information, or at least product-based information. Some of them would be content with the product group-based data, and, for the rest, even more general information would be sufficient. At least, at the initial stage of using the service, when the

aim is to gain basic information and an overall idea of the climate impact of consumption, the product group-based – or even more general – emission data was considered sufficient. However, the participants were nearly unanimous in thinking that, in general, only emission data of those kind products are necessary, that could substantially affect the overall amount of emissions of the households.

Wishes about the accuracy of the data varied between consumption groups and also in the different consumption areas within groups. As regards foodstuffs, transport fuels and transport services most of the participants would prefer brand-specific information or at least product-specific emission data. There were also differences in expectations between participants: On a general level, the more conscious about climate issues consumers were the more accurate emission data they expected.

In all groups, it was discussed who should produce the emission information for the service. State-owned research institutions and civic organisations were considered the best sources. Commercially produced information was, however, considered unreliable because of the possibility of aiming at financial gain. It was stated that all information must be verified, at least, by a reliable, independent actor.

An important and very widely shared wish of the participants was that the data content of the service should be easy to understand for the ordinary people. It was also desired that the service would include more information that would help in understanding the presented matters. These are issues such as precise definitions of difficult concepts and units of measure, formulas that the figures are based on, and scientific research data that clarifies the discussed matters and their background in a broader, more detailed manner. Thus, the service is expected to offer an abundance of specific, detailed information, although the participants were very conscious of the potential complexity this might cause. Obtaining specific, reliable information was seen to increase confidence in the service and also motivation to use it. A strong belief in expert information and its reliability became clear in the focus group discussions.

*Positive experiences*

A service that tells about the climate impact of consumption was hoped to primarily communicate reliable information. At the same time, it was hoped to provide positive experiences and fun that could make the service more interesting, and also motivate consumers who have not previously thought about the climate impact of their consumption to use it. Some participants presented that one such method could be adding interactive elements of social media to the service so that users would be able, for instance, to function as information producers and commentators of others' information more than before.

The participants saw the significance of peer-information in changing consumption behaviour into more climate-friendly to increase in the future. The service could become a vital discussion arena for consumers to share their experiences and, at the same time, to control each other in a sense. They considered that social pressure would encourage users behaviour changes and also to accelerate their establishment. Some proposed that some kind of game would be the best way to attract people to use the service and to think about climate impacts of their consumption.

*Personalised service*

A clear majority of the participants liked the idea of a personalised service. They considered that an opportunity to tailor the monitoring and feedback service according to their personal needs would increase their interest to use it. They also expected that modifying the service to suit their wishes would increase its usefulness and contribute to connecting it in their

everyday actions and practices. One of the benefits of a personalised service would be content-related "stratification" so that each user could conveniently use it in their chosen extent. True enthousiasts could examine the contents more carefully and those with less interest could use a more concise version. Tailoring the service would, thus, be a way to consider the different backgrounds of its users.

The participants hoped that the service would, in addition to providing information on their own household's emissions and comparisons with emissions of other households of same size, provide information on what interests "only me and my household". It should, for example, give personalised tips for reducing emissions in the least troublesome way. They also wished that it would be possible to add interactive and entertaining additional features to the service.

*Including commerce and service providers into the development work*

The participants also wished to include commerce and service providers into the development work of the service. Their requirement that purchases should be automatically registered into the system would mean that all or at least the largest retail chains are to be included in the service development. In addition, service providers were hoped to invest in a more extensive selection of climate-friendly products. A responsible store would sell only products that have been produced and transported in climate-friendly ways. The discussion about including several chains into the service also created discussion on what consequences the joint participation would have. Potential problems with data security or costs were meditated on.

*Rewarding for reduction of the emissions*

One purpose of the pilot was to examine the possibilities of a reward or bonus system in encouraging consumers to change their consumption habits into more climate-friendly. An opportunity to receive rewards, calculatory Climate points, for a sufficient reduction of the GHG emission amount of a household's foodstuffs purchases during the trial was included in the pilot. It was possible to get Climate points only for foodstuffs that were automatically registered into the system, i.e. products purchased from K-supermarkets. The bonus system was used by 19 participants, but the idea of a bonus system was evaluated by all participants.

The majority of the participants considered that getting a reward for reducing GHG emissions would motivate them to change their consumption behaviour into a more climate-friendly direction. They thought that a reward might inspire other consumers as well to use the service and so reduce their emissions. However, some thought that it is, in any case, only those consumers who are interested in ecological consumption who would become users. A bonus system would hardly render the service more interesting to them – or those who do not monitor the climate impact of their consumption ordinarily. Climate-conscious participants and those who participated in testing the bonus system had the most positive attitude towards the system.

Realising the bonus system in a just way was considered very difficult to do. The participants felt in general that customer bonus or loyalty point systems are eventually paid by the consumers through higher product prices, and that those who have no chance of getting rewarded will have to contribute to the costs. Another weakness of a rewarding system in a service like this was seen to be the possibility to cheat. It would be easy to trick the systems by distorting the data registered into it, for example, by buying products that create a great amount of emissions in stores outside the system. Removing the possibility to cheat was considered almost impossible, because the use of the system would, at least initially, be based on voluntary participation.

It was also discussed what would be just rewarding. Should the basis for getting a reward be improving one's own actions or maintaining an already good situation? Approximately half of

the participants felt that a reward should be given only for a significant and permanent reduction of emissions. At least, the idea of currently used rewarding and bonus systems (the more you buy, the more you get bonus) was considered unsuitable for this purpose. It was seen as conflicting with reducing emissions. The largest climate bonuses should be given to those who consume the least, which was, however, seen to be in conflict with the financial goals of chains of stores.

The participants had several, even contradictory views on how consumers should be rewarded for reducing GHG emissions. The general opinion was that the reward for reducing emissions could be something else than a direct economic reward to customer. By far the best motivation was considered to be the steady extension of the portfolio of low emission products on offer in the retail chains. This aspect was underscored by most of the participants.

Money was considered a relatively good motivation to reduce emissions by nearly half of the participants, but it was considered the best motivation by only a few. Instead of a direct economic reward, monetary advantage could be manifested in the form of lower environment taxes in product prices so that products that are more detrimental to the climate would be taxed heavier.

Some thought that an example of a motivating reward could also be a virtual reward that makes the user feel good such as when a partner organisation donates money to climate protection. Some are motivated by competing against their friends using social media, for instance. For some, the best and the only motivation for reducing emissions is the battle against themselves.

Last but not least, it should be stressed that the above sections on the opinions of the participating consumers are typically meant to summarise what the participants experienced, thought and expected. This does not mean that the researchers regard the argumentation always as adequate, but it shows that there are dilemmas to be dealt with (e.g. combining ease of use, personalised monitoring pages and the option to provide abundant information at detailed levels).

## Conclusions

The aim of this pilot study was to assess the possibilities of the combined monitoring and feedback service to motivate consumers to reduce GHG emissions of their consumption. The demo version of the monitoring and feedback service appeared to the participating consumers as a new technology-based innovation. Some of them were familiar with the idea of monitoring the climate impact of consumption with the help of an Internet-based service thanks to other carbon footprint calculators. Many had also been interested in climate and environment issues before, and some were true enthusiasts. However, for some, the idea of the service was completely new and strange; they had their first experience only when testing the service started. For these participants, comprehending the service was difficult at the beginning, because they did not necessarily have a point of comparison that might have helped in understanding the idea (cf. Geels, 2005).

The results show that the idea of the service interests consumers. They are willing to learn about issues related to climate change and also about how they can influence it. It appears that changes in consumer behaviour require expressly "awakening", concrete tools that help people to see the amount of emissions of their consumption. Environment and climate-conscious consumers are regarded as the first potential users, but the idea of the service may also gain broader popularity amongst consumers, especially if they are expected to participate in preventing climate change even more in the future. How well the service will be able to match the consumers' varied expectations in reality remains a question, however. This is

because the practical realisation concerns several broad issues that may even be difficult to solve.

One of the most essential challenges, also from the viewpoint of consumers, is related to the accuracy level of the contents and their reliability in general. The requirements of consumers who are interested in climate and environment issues, the perceived primary users, seem to be precise, preferably product group specific emission details of as many products as possible. These are needed to support the decision to purchase and also to obtain a reliable impression of the household's total amount of emissions. At the beginning, while getting used to the idea and mainly testing the service, less accurate product group specific details are considered sufficient, but average information is not considered to encourage towards continual use.

It is essential for the user that the service is user-friendly, functional, and reliable. The most inconvenient element in the use of the service was registering purchases and consumption manually, which also made the acceptability of the service questionable. Foodstuffs purchased from participating K-supermarkets were registered automatically, but other consumption data had to be entered by the user. A virtually unanimous requirement for future systems is the nearest thing to an extensive automatic registering of purchases. Consumers' trust in the system also presupposes reliable handling of personal data. Confidence in the service consists of several elements and is an absolute requirement for wide-spread, established use of the service.

Despite the doubts, the service is found useful, in the general level. In addition to benefits, the interactive, entertaining, and experiential features of the service may attract consumers to use it. Tailoring the service to suit each user's needs and wishes seems to be one of the best ways to anchor continual use of the service into the everyday routines. In addition, the rewarding system that will probably be connected to the service might have the potential to encourage consumers to make their consumption habits more climate-friendly. The consumers appear to have different opinions on what is a reward that encourages making changes in consumption. According to the participants, the most important incentive to change consumption habits would be developing the product range in shops into more climate-friendly.

One of the questions the consumers raised was the role of commerce and other service providers, as well as industry in the development work. The consumers expect that the possible new versions are not limited to only one chain of stores, but that they would include as many retail trade groups and other service providers as possible. Consumers did not only estimate the changes in consumer practices, but also discussed how the service may affect supply. They expect that the commerce would invest considerably more in developing climate friendly product ranges.

Results show that most of the participating consumers believe that using the complete service could affect people's consumption behaviour. It could help people to reconsider their consumption, and also change their consumption habits into a more climate-friendly direction.

*Limitations*

Some limitations in the study should be noted. The results of the pilot study cannot be generalized to all Finnish population, because the participants were not a representative sample of Finnish people. Most of them were members of the Consumer Panel maintained by the National Consumer Research Centre. The panellists can be described as active consumers who are widely interested in consumer issues and want to affect consumption and the markets, in general. In addition, most of the other participants were consumers who were more aware of climate and environmental issues than people on average are. Thus, the results tell about experiences and views on one hand of the active consumers, and on the other hand of the relatively climate-conscious consumers.

In addition, the current pilot in fact covered only some questions of the many to be answered prior to the launch of the real monitoring service. The pilot aimed at getting a first (crude) impressions of the acceptance of and interest in this kind of services, and of the functionality of the system for consumers/households. The time span of the pilot (four weeks) was a bit too short to ensure that change in purchase decisions and in the resulting emissions were really attributable to the monitoring system; actual thresholds to engage in participation (and threshold lowering measures) were not tested in a quantitative sense. The reward and bonus system was only rudimentary tested (and appeared to be perhaps one complication too much in an already rather complex type of innovation). For example, the comments regarding reward systems can also be interpreted such that the consumers may want to have a choice in the type of reward. Furthermore, the reward system may be more important with respect having households continuing the service rather than its possibly very modest impact on the emission reduction achievement.

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