User evaluation of the first prototype of the interactive web tool EcoRunner

Lars E. Olsson, Helena Shanahan and Hélène Wåhlander

CFK-RAPPORT 2009:04

GÖTEBORGS UNIVERSITET
HANDELSHÖGSKOLAN

Centrum för konsumtionsvetenskap
Handelshögskolan vid Göteborgs universitet
Box 606
405 30 Göteborg

e-post: cfk@cfk.gu.se
www.cfk.gu.se

ISSN 1653-7491

CFK-rapport 2009:04

User evaluation of the first prototype of the interactive web tool EcoRunner

Lars E. Olsson[1,3], Helena Shanahan[1,2] and Hélène Wåhlander[1,2]

[1]Centre for Consumer Science, University of Gothenburg
[2]Department of Food, Health and Environment, University of Gothenburg
[3]Service Research Center and Department of Psychology, Karlstad University

Contents

Summary

EcoRunner is an interactive web tool that has been designed to be the "best possible" modelling tool for portraying direct and indirect environmental effects of household metabolism when it comes to energy, carbon and nitrogen. This report analyses the first two steps of a pilot study evaluating households' reactions to, and use of, the tool. Participants were asked first to use EcoRunner to record their consumption of 115 different products and services into five main categories; housing, household purchases, leisure, transports and compensatory measures. Afterwards they were asked to answer six open-ended questions about their experiences in using the tool and to give suggestions for improvements. The results show that household purchases represent the largest part of money spent, and as a consequence also the largest flows of energy, carbon dioxide equivalents, and nitrogen. Households with children spent considerably more money per year on all consumption sectors, with the exception of compensatory measures. In general participants rated the testing exercise as interesting and the tool as user-friendly. However, the results also show a major contradiction; some respondents felt that the tool was too detailed and complex, whereas others wanted a more detailed level. The time period for consumption (yearly basis) was problematic for some users, and some stated that they would have preferred to use metric units to describe their consumption instead of a monetary unit. Some households asked for more items related to both compensatory measures and the non-formal economical sector. The results of these first two steps of the pilot study in evaluating EcoRunner have provided valuable and insightful information that will be used as guidelines in further refinements of the tool.

Keywords: Consumption, EcoRunner, Environmental load, Household metabolism, Interactive web tool, User evaluation

1. Background

This report analyses the first two steps of a pilot study of an interactive web tool called EcoRunner, and gives recommendations for further development. Step one describes households' use of EcoRunner in the form of their recording total consumption and it's consequences for flows of carbon, nitrogen and energy, whereas step two analyses households' opinions about user-friendliness. The tool was constructed in the project *Household metabolism (HM) - Modelling the indirect environmental load of household purchase decisions and using the results to explore options for reductions and systems effects*, undertaken by a collaboration between the Industrial Ecology Department at the Royal Institute of Technology (KTH) and the Centre for Consumer Science at the University of Gothenburg. The tool has been designed to be the "best possible" modelling tool for portraying direct and indirect environmental effects of household metabolism when it comes to energy, carbon and nitrogen. Within the project a detailed Requirement Specification has been developed covering modelling and the user interface of EcoRunner (Assefa, Frostell, Olsson, Shanahan & Wåhlander, 2008) as well as a thorough review of the literature related to life cycle assessments and environmental behaviour (Kutter, 2009). EcoRunner comprises two parts; EcoRunner-Total and EcoRunner-Purchase. The EcoRunner-Total model compares material and energy flows for five different product and service *categories*: housing, transports, leisure, household purchases and compensatory measures, whereas the EcoRunner-Purchase model compares the material and energy flows for specific products, e.g. the effects of a product produced or manufactured in different countries, such as Spanish versus Swedish tomatoes. Although the project focus has shifted towards the EcoRunner-Total model, both models are implemented in the same web tool, henceforth referred to as the tool. EcoRunner-Purchase was not fully developed when the first step of the pilot study was launched and is not focused in the testing.

The purpose of the pilot study was to explore how the tool can be used in everyday life to define household spending and its environmental consequences in detail, which might then contribute to reducing the negative environmental impact of consumption. The specific objective of the first two steps of the pilot study was to study the households' reactions to the content and the use of the tool in order to make revisions before launching a behavioural experiment, which will constitute the third step of the pilot study.

The overall hypothesis is that relevant feedback of reliable and transparent information on the consequences of one's own consumption is an important condition for the change towards more environmentally friendly consumption behaviours (Garnder & Stern, 2002). This has been documented in earlier research dealing with household waste management (Åberg, Renström, Shanahan, & Säljö, 1996), food consumption (Shanahan, Carlsson-Kanyama, & Pipping Ekström, 2003), energy consumption (Ekström, Jonsson, Renström & Shanahan, 1996;

Darby, 2006), and travel (Fujii & Taniguchi, 2005). Although results from some feedback programs (travel) have generated reduction levels of up to 35 % (see Fujii & Taniguchi, 2005; Fujii, Bamberg, Friman, & Gärling, 2009), results from other forms of feedback programs generally yield reductions between 5 % and 15 % (Gifford, 2002). Although such behavioural changes may be viewed as minor at an individual level, aggregating them may yield considerable effects. It is therefore important to find programs and tools aiming at more environmentally friendly consumption behaviours that can be easily accessed by the ordinary household. EcoRunner may become such a tool, with easy access on the internet.

2. The Pilot Study

In the first step of the pilot study, household metabolism was described by recording the households' consumption in terms of the money they have spent on products and services during the last year and displaying its consequences for flows of energy, carbon and nitrogen. The second step evaluated user-friendliness of the tool. This was assessed by a questionnaire addressing different aspects of using the tool. Based on the results from step 1 and 2 recommendations are provided for a revision of the tool.

In a third step the revised version of the tool will be tested by the same pilot group as in step 1 and 2 to see if their behaviour pattern has changed in any way from the first recordings. The revised version will also be used in a behavioural experiment to be carried out with a new group of households. The different steps of the pilot study are summarised below in Table 1.

Table 1 Structure of the pilot study during 2009/2010.

Period	Step	Activity
April	1	Households record their consumption using first prototype
April	2	Households receive evaluation questions
May		Analysis
August/December		Revision of the first prototype
January	3	Households from step 1 and 2 will test the revised tool.
January/February		An additional sample will be recruited for an experiment to test the influence of EcoRunner on environmental behaviour.
Spring		Analysis

3. Sample and Procedure

Three households participated in a pre-test in order to correct any unclarity related to the instructions in the tool as well as the relevance of the question of user-friendliness. Based on this the tool was slightly revised. After revision, snowball sampling was used to recruit 40 households in three cities of different size and in different regions of Sweden. A few participants lived outside the cities in rural areas, the remaining lived in urban areas. The distribution of male and female was even. The sample covers different household sizes and structures. Instructions on how to use the tool were sent out to the households in April, 2009 and they were asked to test it within ten days. When this report was drafted, 12 households had made a complete record of their spending aggregated to a yearly basis and received feedback on its consequences by the EcoRunner tool for flow of energy, carbon dioxide equivalents and nitrogen, respectively. At the same time an additional, 23 households had responded to the questionnaire. After a reminder was sent out, two households replied that they were too busy to participate. One household had dropped out early on since they found the information requested in the web tool too personal to disclose. No other reasons have so far been given for dropping out.

4. Step 1 – Using the Tool Recording Consumption

The specific objective of the first step of the pilot study was to study the households' use of the tool. Instructions on how to log in to the tool were given to participants by e-mail. Further instruction on how to use the tool was given to them within the tool once they had logged in[1]. They were first asked to create a personal account where they recorded information on age, gender, level of education and their household composition. When this was done they were ready to start using the tool.

The tool compares money spent on different product *categories* and its consequences for carbon dioxide equivalents, nitrogen, and energy flows. The tool is divided into five main categories: *housing, household purchases, leisure, transports*, and *compensatory measures*. Each main category is divided into sub-categories; each listing a number of products and services (henceforth called items). In total EcoRunner consists of 115 different items. There is a screenshot of the tool below, [Figure 1].

[1] A detailed description of all instructions and information given to the participants during the pilot study can be provided by the authors upon request.

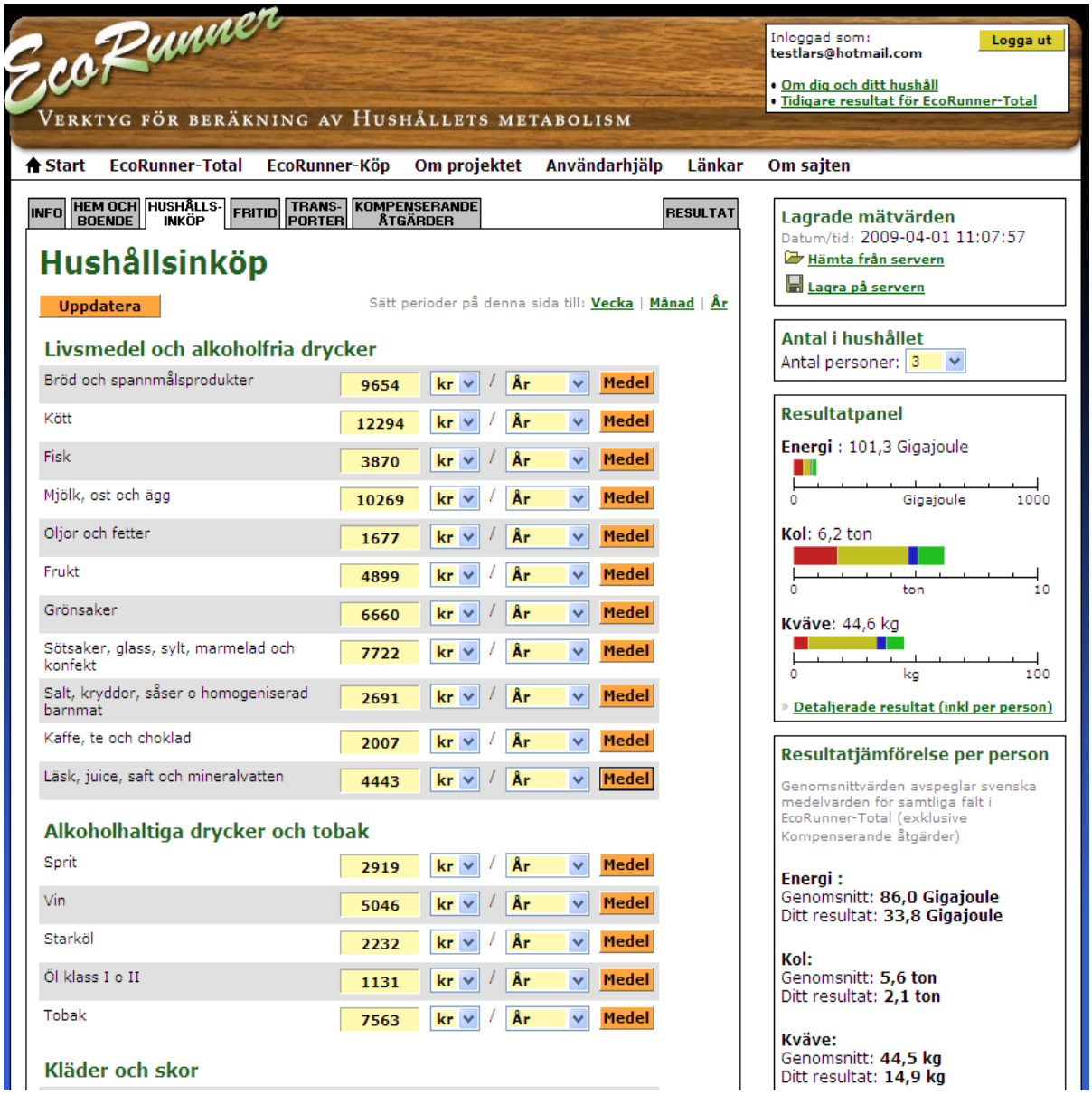

Figure 1 Screenshot of EcoRunner-Total. Under the tab “Hushållsinköp” some of the items included in the main category Household Purchases are displayed and the aggregated results at the household level for energy, carbon and nitrogen can be seen in the graph to the right. The box, lower right, compares the average household member with results for the “average Swede”.

For each item, participants recorded how much money their household had spent on a weekly/monthly/yearly basis. If they had not spent anything on an item they left that box blank (or entered a 0) and proceeded to the next item. When participants did not know/did not remember how much money they had spent on

an item, they could use a specific button called "average Swede" and the spending for the average Swede was displayed. When the average Swede value was displayed it took into account how many members they previously had recorded in total for their household.

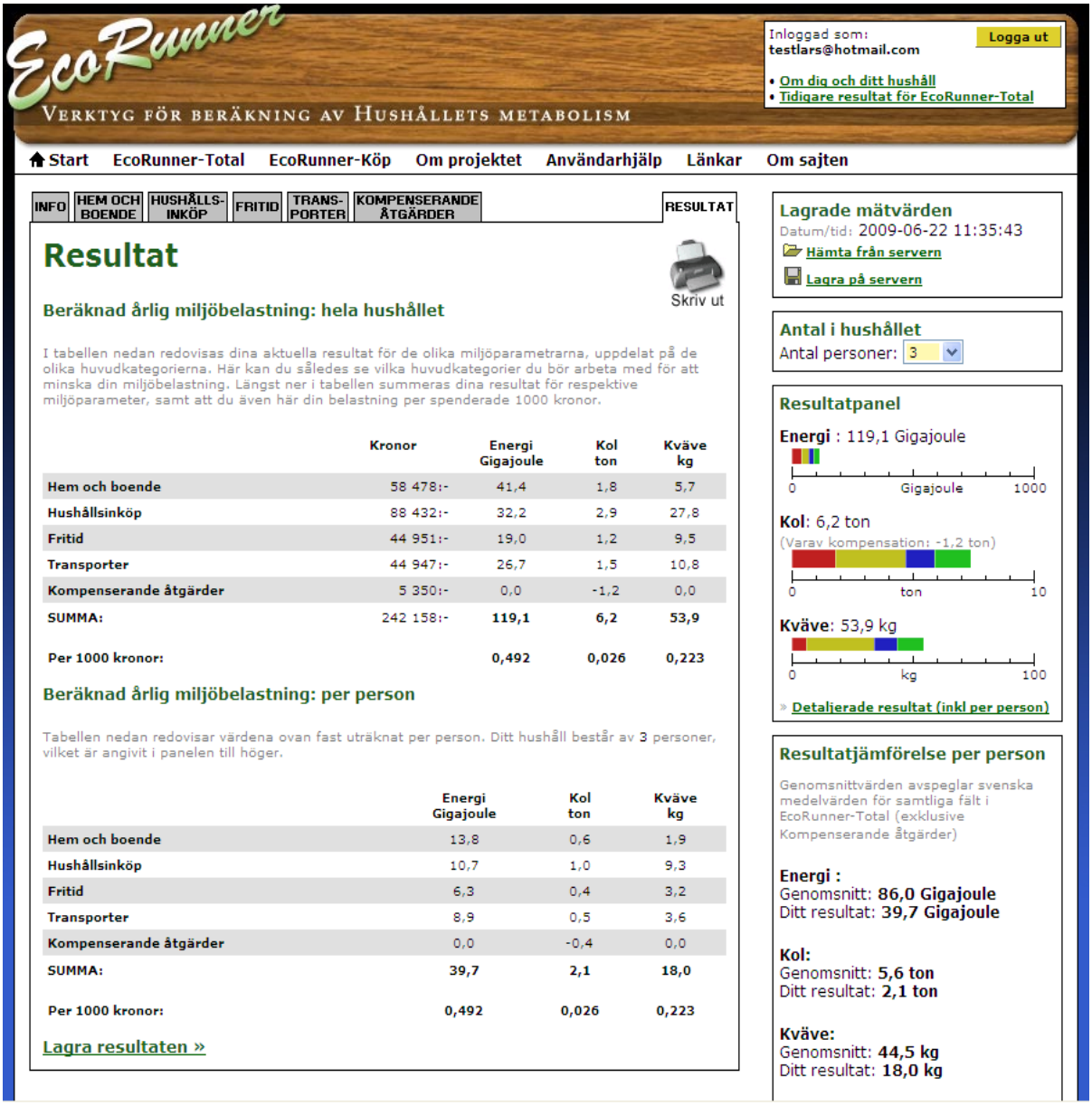

Figure 2 Screenshot of EcoRunner-Total results. Under the tab "Results" the results for the household are displayed for money spent, flow of energy, carbon dioxide equivalents, and nitrogen for each of the five main categories as well as in total. The lower table displays the results of flow of energy, carbon dioxide equivalents, and nitrogen per person in the household.

As shown in Figure 2, direct feedback of the results of *money spent*, *flow of energy*, *carbon dioxide equivalents*, and *nitrogen* were given to each participant numerically in tables and figures for each main category, separately, as well as summarized. All entities for money spent in the figures and tables were recalculated and presented as results for the household on a yearly basis. This means that if a specific item were entered on a weekly basis (e.g. bread) it was multiplied by 52, if another item were answered on a monthly basis (e.g. electricity) it was multiplied by 12 .

4.1 Results Step 1

Although statistically significant differences can be found between different groups of participants in the study, such results can not be regarded as reliable with only 12 participating households recording their money spent on the five main categories. This report will therefore not include any statistical analyses but focuses, instead, on describing the results from the test group with regard to the four variables: money spent, flow of energy, carbon dioxide equivalents, and nitrogen.

4.1.1 Background characteristics

All participants in the test group lived in cohabiting households with partner/wife/husband; half of the households had no children whereas the other half had children below the age of 19 living at home (average 2.17 children/household). The balance between adult females and males was even, their mean age was 39.2 years and all but one were educated at university level. Since household composition is regarded as an important determinant of total spending, and thus related to environmental consequences of everyday life, the results that follow will be presented separately for households with children and households without children.

4.1.2 Money spent

Figure 3, below, shows the money spent for each of the five main categories, as well as for the total amount of money spent during a year. As can be expected there were substantial differences between households with and without children, where the former generally spent more money in their everyday lives. However, one exception was money spent on *compensatory measures* where households without children on average spent 10,000 SEK/year compared with 1,000 SEK/year for those with children. The largest difference between the two groups can be found in the main category *household purchases* where households with children on average spend approximately 90,000 SEK more each year.

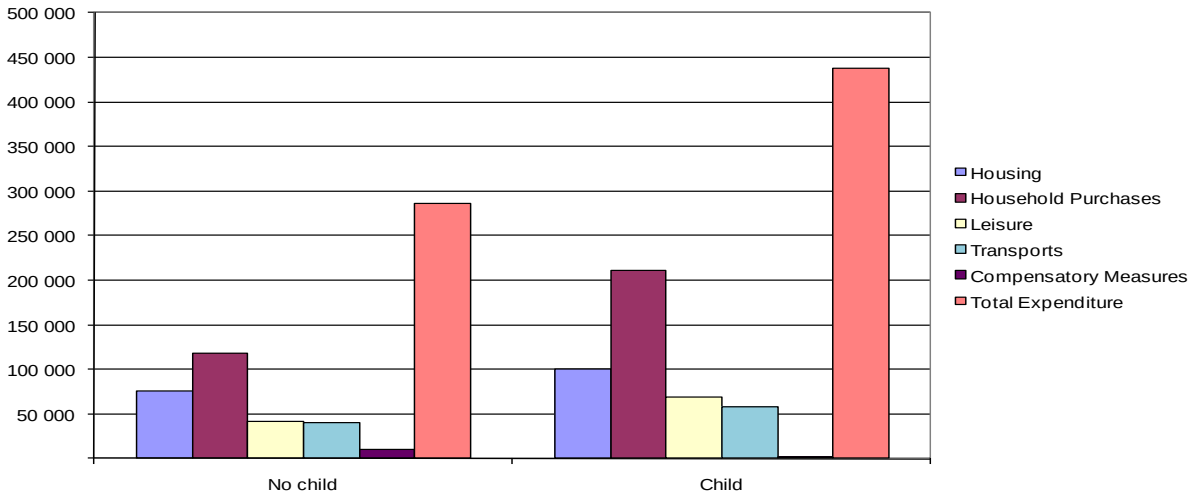

Figure 3 Money spent expressed in Swedish Kronor (SEK) during a year for households with and without children, respectively. At the time of this study 10,000 Swedish Kronor were approximately equivalent to 1,000 Euro.

4.1.3 Flow of energy

For flow of energy the results are slightly different. Housing gave almost the same results for the two groups; in fact slightly higher values for cohabitants without children (see Figure 4.). The other four main categories yielded results in the expected direction, where the largest difference once again can be found for household purchases.

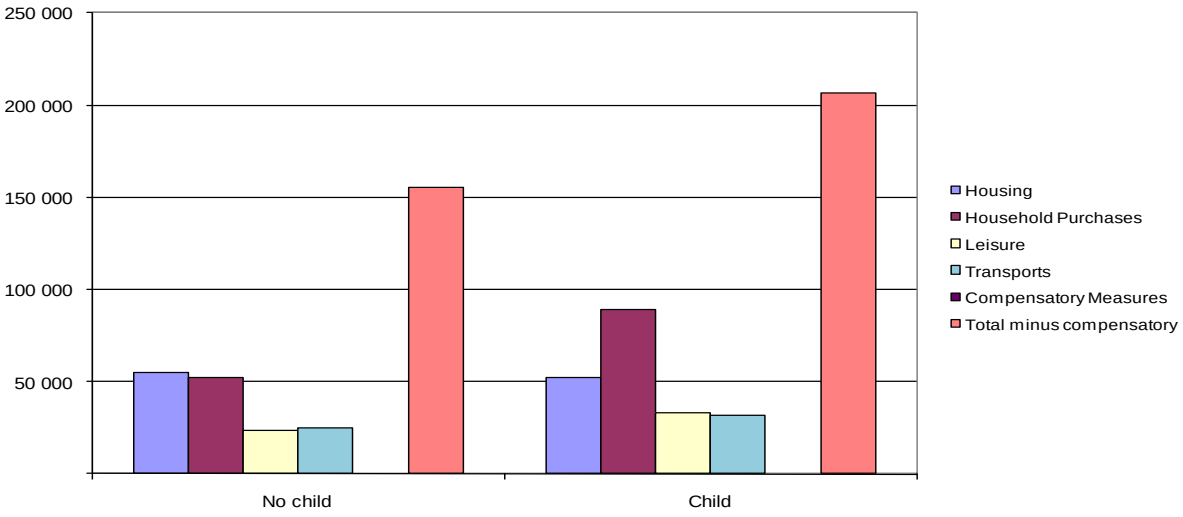

Figure 4 Flow of energy expressed in Megajoule (MJ) during a year for households with and without children respectively. Dividing the results by 3.6 gives a corresponding value expressed in Kilowatt hours (kwh).

4.1.4 Flow of carbon dioxide equivalents

Figure 5 displays the results for carbon dioxide equivalents in tons for each of the main categories. As can be seen the effect of spending money on compensatory measures can contribute substantially to lower the overall flow of carbon dioxide equivalents. The figure shows furthermore that household purchase was once again the largest source, and that households with more members will purchase more and will therefore also be responsible for a larger portion of carbon dioxide flow.

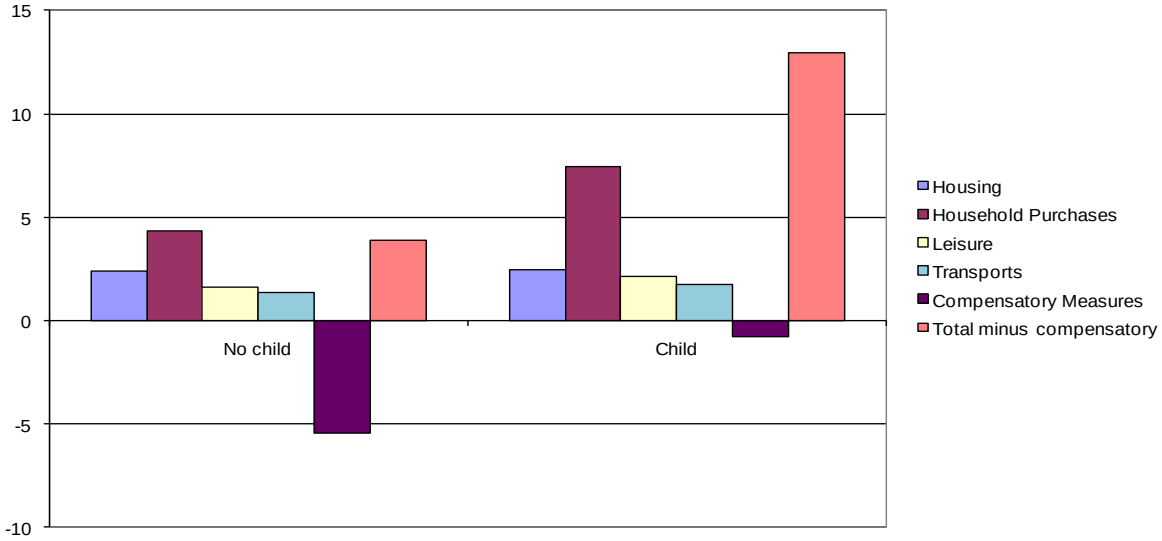

Figure 5 Flow of carbon dioxide equivalents expressed in tons during a year for households with and without children respectively.

4.1.5 Flow of nitrogen

The fourth and final parameter that was given as feedback to the participants was nitrogen, and is shown in Figure 6. For housing, leisure, transports, and compensatory measures there were very little differences between households with and without children. However for household purchases the number of household members can be seen to have a large influence. Household purchases contributed most to the flow of nitrogen; 57 % for households without children and 66 % for households with children.

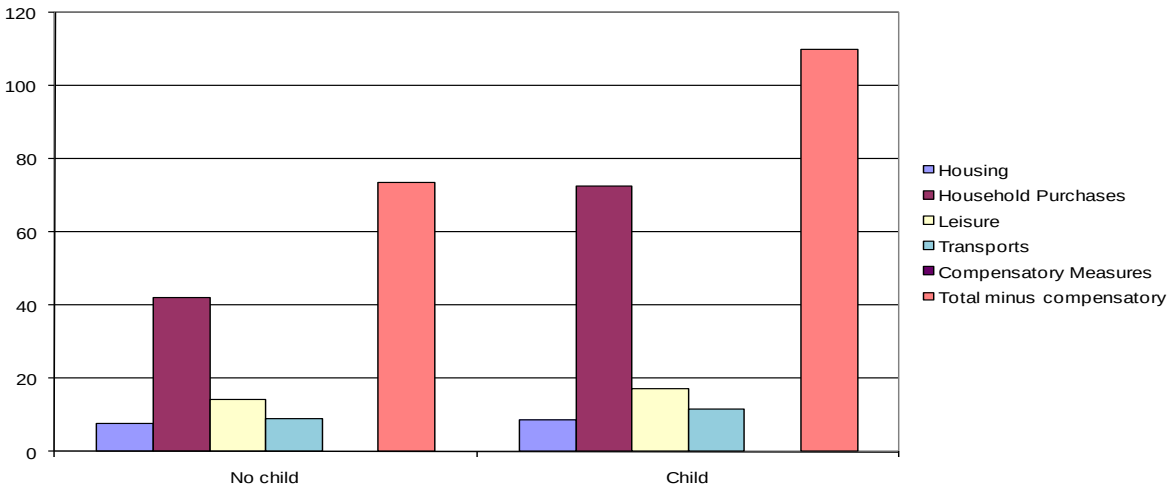

Figure 6 Flow of Nitrogen expressed in kilograms (kg) during a year for households with and without children respectively.

5. Step 2 – Evaluation of User-friendliness of the Tool

To study user-friendliness a questionnaire with six open-ended questions was developed. In previous research this type of question has been shown to yield trustworthy information in exploratory studies such as this one (Carlsson-Kanyama, Wåhlander, Gleerup & Shanahan, 2007). The questions used are given in Appendix A[2]. The questionnaire was sent out by e-mail one week after participants had received the letter with instructions of how to log into EcoRunner. They were asked to answer it within ten days by return e-mail.

5.1 Coding

Respondents were assigned a number from 1 to 40 to ensure anonymity. These numbers are shown in brackets after each response, accompanied by the letter associated with the specific question. An example is a respondent who felt that the tool was too detailed and complex (24:C), where 24 corresponds to the number of the respondent and C to the question "*How easy or difficult do you think it was to navigate in the tool?*".

[2] All answers to the questions in the original language (Swedish) can be obtained from the authors upon request.

5.2 Results Step 2

In their answers to the questions the respondents generally expressed that they found the testing exercise of the tool interesting and that the tool was user-friendly. However the results show a major contradiction; some respondents felt the tool is too detailed and complex (24:C, 40:A), while others wanted a more detailed level (12:A,D). The shifting level of detail between the different categories of consumption created a problem for many. Similarly the different types of purchases, durables and non-durables, created problems in recording the yearly, monthly or weekly cost. This created a feeling of lack of accuracy which in turn lead to lack of confidence in the tool (3:D). However, the usefulness of having the average national figures on consumption expenditures easily available when registering the households' expenditures was often mentioned.

Yet another problem experienced was the use of monetary unit (12:A, 39:E). On the other hand several respondents seemed to have found it interesting to connect their own monetary expenses with environmental impact. Nevertheless, many mentioned difficulties in estimating their own expenditures.

One respondent summarised some of the problems above in expressing his opinion of the tool.

> Feels very complex. I have not yet got out all the figures from the "book keeping". On the personal level the tool seems too "rough". An expensive product which is very well eco-adjusted gives the same cost as many cheap ones heavily impacting on the environment…or have I misunderstood the whole thing" (12:A).

5.2.1 Instructions

When it came to the instructions the respondents had different opinions. One group thought that they were sufficient but had at the same time some critical comments. Only three households answered a straightforward "Yes" to the questions (31, 36 & 39:B).

In many cases the respondents that were critical had creative answers, which showed that they had considered possible improvements. One household suggested that the instructions would be more clear given as "step 1, step 2, etc" (40:B). "Password" would have been better than "A-word to remember" (24:B). One household pointed out that it was difficult to fill in the information about the household having transient children moving out and in (24:B). One household suggested that there should be an "info-box" to every category in order to understand what is included in the different products/services (34:B) and some households felt uncertain about the time periods (16, 29:B). The latter also felt it was unclear whether one should fill in for "the household" or for "the individual"

(16, 29:B). One household (35:B) summarized their thoughts about the instructions by saying that in general they could have been made simpler and smarter.

5.2.2 User-friendliness

In the second step of the pilot project the user friendliness was specifically focused. Eight households answered that it was "easy", "simple", "easy and uncomplicated" to navigate in the tool or expressed in another way that the tool was user-friendly (3, 4, 5, 11, 16, 27, 29, 31, 35:C). Some households thought that it was easy, generally, but had some reservations. "Small and too much text" one respondent answered (24:C), while another thought it was easy, on the whole, but difficult to proceed from the start page to feeding in ones own figures (24:C).

One household thought that the possibility to choose between week, month and year was a good function in the tool, but commented at the same time that it was difficult to know how seldom-made purchases should be treated, for example if an average over time should be calculated (36:C).

The two functions "Update" and "Save" were commented on by some households. One would like to get a clearer feed-back if the figures fed into the tool had been up-dated (1, 2:C). Only one household did not understand "what one is expected to navigate between" (40:C).

Based on the respondents answers, user-friendliness of the tool was not seen as a problem. However, some critical comments can be found under the sections "Respondents' suggestions for improvement".

5.2.3 Content

The consumption expenditures in the tool are grouped into five categories: housing, household purchases, leisure, transports, compensatory measures. Several respondents requested a larger variation of compensatory measures. Such actions as recycling or buying second-hand products have been mentioned (2:D). Difficulty in knowing what expenses that are covered in the posts and if they are correct have been presented (34:D, 39:A). Missing types of consumption were also taken up such as food produced "from nature" (36:D) within household; gifts, for example "leg of lamb" given by parents; housing repairs done by members of the household (3:D, 24.A) or other products and services, i.e. outside the formal economy (36:D). Some concepts were not understood, such as "kallhyra", e.g. rental without heating costs (32:D). Overlapping posts were also identified such as between housing and leisure. For example one respondent asked what category "outdoor equipment" should be reported under: housing or leisure (4:D). Another respondent wondered if all transports, also job-related, should be reported under transports (5:D). The problems experienced with content and calculations related to time are illustrated in the following quotation:

> Sometimes it is difficult to know what is included in the different sections to estimate one's own expenses in a single category, since I don't have a full overview of that and sometimes one buys bigger things such as furniture that one is not doing every year but only seldom and then they may not be included or how should one reason here? Purchase price divided by the number of years I have had the TV for example? (31:D).

One respondent took up ethical considerations about compensatory measures. He meant that if one is going to use solar energy as a compensatory measure a discussion about ethics must be linked to this.

> Otherwise people will easily think that it is a good thing if the EU/World Bank (…) build 'energy-saving' measures in developing countries in order to get out of doing things in the Western world. Think it will be quite contra-productive to put forward an environmental aspect not linked to an ethical discussion (34:F).

5.2.4 Feedback of the households' own consumption

The experiences of feedback of environmental impact from the respondents' own consumption gives a diffuse picture. Some thought their results were as expected (1, 36:E) while some thought "It was not too good" (5, 11:E). Others became shocked "It's just to conclude that we are real environmental gangsters" (2:E) or frightened "Became a bit scared but know that I'm travelling a lot and drive a car so that could be an explanation" (17:E). One of the respondents became confused; he lives in a small flat, is a vegetarian, bikes and walks, and doesn't have a car – and still the tool showed high results (34:E). One respondent could confirm that his simplistic lifestyle had paid off "I'm under the average as a result of my lifestyle. And that is possible to influence" (30:E). However, several respondents were sceptical about their results since they found too much uncertainty in their reported costs (19, 24, 27, 31:E). Two respondents had not been able to complete the registration, possibly due to lack of time (12, 27:E). Several of the respondents referred to and compared their consumption with the figures given for average consumption, which seems to have been of help to them. Unfortunately a few respondents did not think it was worthwhile continuing with the results part of the site (3, 12:E).

5.2.5 Respondents' suggestions for improvement

Many respondents gave valuable suggestions for improvement of the tool (11, 19, 29, 35, 40:F) while several had no suggestions for improvement. The suggestions are summarised in ten categories below.

1) *Inform about content and time period with popup windows.*
- Better explanations about what is covered by the different categories and the individual items for products and services were requested by several respondents (12, 17:F).
- One suggestion is that there should be a pop-up window for every item explaining and listing what is included as well as how one should calculate the cost. For example when clicking on "car" in the "Transportation" category there should be information on what is expected to be included in that post and how the cost should be calculated (16:D).

2) *Link keeping accounts function and/or scanning of receipts.*
- One suggestion for greater accuracy is to just register one month when expenses have been followed very closely.
- One suggestion for obtaining more detailed information is to link a keeping accounts function to the tool (19:D) or to scan receipts (1:A).

3) *Annexing table for future commitment to result presentation.*
- One suggestion for helping consumers to cut down environmental impact on their consumption is to place a table next to the final result presentation in the tool where the user could fill in what he/she thinks should be done in order to tax the environment less (36:F).

4) *Focus on consumption with greatest potential.*
- One respondent suggested that the tool should only focus on consumption that with the smallest possible change in behaviour would result in a large effect (30:F). This, he meant, could be a pedagogic strategy which would have spin-off effects and lead to a change in lifestyle.

5) *Include information on calculation of service.*
- One respondent pointed out that information was missing about how environmental impact of services had been modulated (39:F).
- The same respondent also thought average national costs of Compensating Actions (39:D) should be calculated. He would like to see both included in the tool.

6) *Improve the design.*
- Comments on the design were given by two respondents (5:F, 31:F). One did not think the design was very attractive and one reflected over how a dyslectic person would handle all the text.
- The latter also suggested that the screen background to the menu for the categories of consumption should be different from the menu for presenting results (31:F).

7) *Use more detailed level.*
- Two respondents asked for a more detailed level in recording expenses. Changes in behaviour related to minor purchases as well as the daily use of them, for

example household appliances, could then be visualised in a better way (27:F, 32:F).

8) *Use of monetary unit.*
- Some respondents opposed the use of monetary units and would have liked to have metric units instead (27:F).

9) *Include work-related activities.*
- A couple of respondents have mentioned the difficulty to separate activities those "in the households" and those related to work; for example transports (5:D, 39:E).
- Some also point out that other activities related to work should be included.

10) *Develop EcoRunner-Purchase for mobile phones.*
- EcoRunner-Purchase was appreciated by one respondent who saw a future use of the model by mobile phone, to make it easy to compare tomatoes from Sweden or Spain while in the shop (1:A).

6. Discussion

The results from the recordings of household purchases show that on an aggregated level more spending causes more flows of energy, carbon dioxide equivalents and nitrogen. It was also shown that of the five main categories measured, household purchases are responsible for the largest proportion in each of the four parameters: money spent, flow of energy, carbon dioxide equivalents, and nitrogen (except for flow of energy related to households without children where housing was slightly higher). This is important to emphasize this result since household purchases is one of the main categories that households, with relatively little effort, could influence markedly; in contrast to, for instance, changing the heating system or buying a car running on alternative fuels, which often needs more planning to accomplish with a longer time perspective and greater financial investment.

It was also found that money spent on compensatory measures was a good investment since it led to large reductions (compensation) in flows of carbon dioxide equivalents. This is not any spectacular news, but is still worth mentioning as an important aspect to highlight since changing current lifestyle and purchasing behaviour have been proven difficult. The compensatory measures did however display surprisingly large amount of compensation of carbon dioxide equivalents. It is therefore suggested that before making any final conclusions on the influence of compensating measures, all calculations related to this main category in the tool should be looked at carefully once more to make sure that they have been assessed correctly.

Furthermore the results show that even though households with children on average comprised twice as many members as cohabiting households without children, increasing levels of money spent, flow of energy, carbon dioxide equivalents, and nitrogen do not increase in proportion to household size. This result may in fact be somewhat underestimated in the tool since each member of the household was treated as one consumption unit. Arguments have been raised to give different weights to adults and children since they do not consume an equal proportion of the household purchases, an issue that has led to new recognized standards for consumption units. Following Statistics Sweden's (2008) scale for weighting the figure for single adults is 1.16, for cohabitants 1.92, children 18-19 0.96 and younger children 0.56-0.76 consumption units. The "average Swede" function in the tool only took into account the number of members in the household and did not use weights for different consumption units. Thus, when a household of five members (two adults and three children) pressed the button "average Swede" for a specific item, the tool multiplied the average Swede value by 5 (adults). This means that the values displayed were somewhat overestimated, and may thus have lead to overestimated results. If further refinement of the tool incorporated weights for consumption units, a more sophisticated and accurate measure of household metabolism may be assessed.

The six open-ended questions gave satisfactory information for revision of the tool. However, the high dropout rate is a major drawback. This could be expected since considerable work input is requested from the respondents, who might not have fully realised that before the tool was presented to them. Another reason is that the test period was postponed to late spring when many households become very busy with outdoor activities: occupied with activities related to the many public holidays; end of the school-term and work commitments before the long summer holidays etc.

The results related to the problem in identifying the time period is expected but surprising. It is expected since earlier research has found that it is difficult to estimate consumption in a certain time period (Shanahan, Carlsson-Kanyama & Pipping Ekström, 2003). This issue was also much discussed during the planning phase of the project. However, in the instruction for the tool it is stated:

> The year you made a capital investment buying a product or service (i.e. a car, fridge, house repair) the cost should be divided with the estimated duration of the service or product.

Obviously this was not enough to make clear how seldom-made purchases should be treated in the calculations.

Another issue much discussed during the development of the tool is the use of monetary units. The use of metric units was first explored but in the end very pragmatic reasons decided the use of SEK: the easy access through the national

statistics on environmental impact related to expenditures and the assurance of possibilities of continuous up-dating. However, the use of environmental impact per monetary unit has some illogical dimensions built into it, which also was pointed out by the respondents. Nevertheless, the data gathered in this study shows that there also is a positive side to this. Thinking in terms of expenditures when using the tool seems to have started the respondents to connect making/keeping a household budget relating that to environmental costs. This could be a breakthrough!

The problems experienced by respondents related to the categorisation of consumption expenditures could also be expected as well as the level of detail. The concept "household metabolism" demands that the "total" consumption of products and services is covered and modelled. To develop a tool which does so is next to impossible. The project objective was therefore the development of "the best possible tool," which means that the ambition of full coverage should be striven for but not be expected. Unfortunately the revision of categorisation as well as the level of detail has very few degrees of freedom taking into account the use of national statistics.

Only one respondent (39:5) commented on the interactive function of the tool which from the researchers' viewpoint is a very important dimension. Navigation on the site as well as results stored will give more information about this. The interactive function of the tool will be given more attention in Step 3 of this project.

The results of the first two steps in evaluating EcoRunner have provided valuable and insightful information that can be used as guidelines in further refinement of the tool. When such a revision has been completed and the tool has been tested a second time in Step 3, the main hypothesis, that relevant feedback of reliable and transparent information on the consequences of one's own consumption is an important condition for the change towards more environmentally friendly consumption behaviours, can and will be tested. Thereafter conclusions may be drawn on the influence on behaviour of such a tool as EcoRunner.

7. Recommendations for Revision of the First Version of EcoRunner

Finally, emphasising the participatory character of the HM-project we feel that certain revisions taking into account the results from the recorded use of the tool in Step 1 and the suggestions of the respondents' opinions in Step 2 are necessary before the next step is launched. In Table 2 below our recommendations can be found in order of priority. The 15 recommendations are organized in three columns, one for each of three categories. The items listed under the category *recommended revisions* are of priority and should be addressed before a new version of the tool is launched. The second category *additional recommendations* should be considered when recommended revisions have been assessed, and time and budget allows for it. The final category *future development,* relates to ideas that could be worth addressing in future versions of the tool.

Table 2. Recommended revision, additional recommendations and future development of the tool.

	Recommended revisions	Additional recommendations	Future development
1. All calculations related to compensatory measures should be looked at carefully once more to make sure that they have been assessed correctly.	X		
2. Clearer instructions for the user that the consumption of the whole household should be included.	X		
3. Clearer instruction for the user about the time period for consumption.	X		
4. Development of pop-up windows with information on what is included in each post/item.	X		
5. Take into account recognised standards for consumption units when providing the "average Swede" values.	X		
6. Improvement of final result presentation to make it easier to read.	X		
7. Inclusion of information on calculation of environmental impact of services.	X		
8. Improvement of graphic web design.	X		
9. Figures entered, e.g. numbers or costs, should be possible to erase with one easy command. Previously saved results should also be possible to erase if user so wishes.		X	
10. Average values should be available not only on a yearly basis but also on weekly and monthly bases		X	
11. Developing a version of the tool with metric units.			X
12. Annexing a table for future commitment to result presentation. This could be built into the experimental phase of the pilot project.			X
13. Linking keeping accounts function and or scanning of receipts. A part of the tool could be developed for a more detailed level where users register factual figures from keeping accounts, saving/scanning receipt.			X
14. Developing a version of the tool to limiting it to consumption with greatest potential			X
including work-related activities			X
15. Developing EcoRunner-Purchase for mobile phones			X

References

Åberg, H., Renström, Å., Shanahan, H. & Säljö, R. (1996). Responding to Agenda 21 and the introduction of weight based billing - a case study. *Journal of Consumer Studies and Home Economics*, *20,* 63-81.

Assefa, G., Frostell, B., Olsson, L. E., Shanahan, H., & Wåhlander, H. (2008). Hushållets metabolism – modellera den indirekta miljöpåverkan av hushållens inköpsbeslut och överföra modellen till en Kravspecifikation version 1.0, 2008-12-14. [Household metabolism - Modelling the indirect environmental load of household purchase decisions and transforming the model into a Requirement Specification version 1.0, 2008-12-14]. Unpublished manuscript.

Brembeck, H., Karlsson, M. A., Ossiansson, E., Shanahan, H., Jonsson, L., Bergström, K. & Engelbrektsson, P. (2007). *Fika, fiske och föreningsliv [Drinking Coffe, Fishing and participating in Running a association]*. Göteborg: Centre for Consumer Science (CFK).

Carlsson-Kanyama, A., Wåhlander, H., Gleerup, A., & Shanahan, H. (2007). Menutool – Ett verktyg för klimat- och näringsanpassad måltidsplanering[MenuTool – A tool for considering climate and nutrition aspects of meal planning]. Stockholm: Skolan för energi och miljö, KTH Stockholm och Institutionen för mat, hälsa och miljö, Göteborgs universitet, TRITA – IM: 2007: 32.

Darby, S. (2006). The Effectiveness of Feedback on Energy consumption. A Review for Defra on the Literature on metering, billing and Direct Display. Oxford: Environmental Change Institute. University of Oxford.

Ekström, M., Jonsson, L., Renström, Å. & Shanahan, H.(1996). *Matvanor och el i små lägenhetshushåll [Food habits and electricity use in households living in small apartments]*. Göteborg; Department of Home Economics, Göteborg University, Research Reports.

Fujii, S. & Taniguchi, A. (2005). Travel feedback programs: Communicative mobility management measures for changing travel behavior. *Proceedings of the Eastern Asia Society for Transportation Studies, Vol. 5*, 2320-2329.

Fujii, S., Bamberg, S., Friman, M., & Gärling, T. (2009). Are effects of travel feedback programs correctly assessed? *Transportmetrica*, Volume *5*:1, 43 – 57.

Gardner, G. T. & Stern, P. C. (2002), *Environmental Problems and Human Behavior*, Pearson Custom Publishing, Boston, MA.

Gifford, R. (2002). Making a difference: Some ways environmental psychology has improved the world. In R. B. Bechtel & Churchman, A. (Eds.) *Handbook of environmental psychology*. John Wiley & Sons, Inc.

Kutter, R. (2009). Informational strategies in websites for sustainable consumption: An exploration of the EcoRunner Tool. Masters Thesis, Royal Institute of Technology, Stockholm, Sweden.

Shanahan, H., Carlsson-Kanyama, A., & Pipping Ekström, M. (2003). Exploring opportunities for eco-sound food habits. Households and researchers in partnership. *Kappa Omicron FORUM, 14, 1, 1-15, http://www.kon.org/archives/forum/14-1/shanahan*.

Statistics Sweden, SCB (2008). http://www.scb.se/Pages/TableAndChart____104224.aspx, Mars 5, 2008

Appendix A Questionnaire in Swedish and translated to English

Original questionnaire in Swedish:

Nu hoppas vi att du har haft möjlighet att testa **EcoRunner**. Vi har några frågor som vi skulle vilja att du besvarade före 8 maj. Skriv in dina svar i det här mailet och skickat tillbaka till mig.

A. Rent spontant vad tycker du om **EcoRunner**? Beskriv i några punkter hur du upplevde att använda verktyget.
B. Tyckte du att instruktionerna var tillräckliga? Om inte vad tyckte du fattades.
C. Hur tyckte du att det gick att navigera i verktyget?
D. Har du några speciella synpunkter på de olika avsnitten hem och boende, hushållsinköp, fritid, transporter, kompenserande åtgärder?
E. Vad tänkte du om dina resultat?
F. Har du några förslag till förändringar av verktyget?

Med hjälp av dina svar kommer vi att revidera verktyget och återkomma med en ny version om några veckor.

Tack för din medverkan!

Questionnaire translated to English:
We now hope you have had the opportunity to test **EcoRunner**. We have some questions we would like you to answer before May 8. Enter your answers direct in a Reply e-mail and return to me.

A. Spontaneously, what do you think about **EcoRunner**? Describe briefly how you experienced using the tool.
B. Do you think the instructions were satisfactory? If not, what do you think was lacking?
C. How easy or difficult do you think it was to navigate in the tool?
D. Do you have any specific opinions on the different categories: Housing, Household Purchases, Leisure, Transport, Compensatory Actions.
E. What do you think about your results?
F. Do you have any suggestions for changes to the tool?

With the help of your answers we will revise the tool and get back to you with a new version in a few weeks time.

Thank you for participating!

Tidigare CFK-rapporter

2009

2009:01 Konsumentrörligheten på de finansiella marknaderna – en uppföljning åtta år senare, Merja Mankila och Amelie Gamble

2009:02 Bilens roll för människors subjektiva välbefinnande, Cecilia Jakobsson Bergstad, Amelie Gamble, Olle Hagman, Lars E. Olsson, Merritt Polk och Tommy Gärling

2009:03 E-bio och mobilkamera. Elefanter och myror i digital visuell kultur, Karin Wagner och Magnus Mörck

2008

2008:01 Konsumtionsmakt 2.0, Lennart Hast och Eva Ossiansson

2008:02 Borås Fairtrade City – En stad som märks, Niklas Hansson

2008:03 "Den goda måltiden. Berättelser om mat och ätande i Vi föräldrar och Kamratposten 1969-2007", Barbro Johansson

2007

2007:01 Grönsaker eller godis? Kulturella perspektiv på nordiska barns kosthåll, Barbro Johansson (red)

2007:02 Marknadsföringsforskning om konsumenter och konsumtion, Karin M. Ekström, Ulrika Holmberg och Eva Ossiansson

2007:03 Mer ekomat i storköken? Utvärdering av 7-miljonersprojektet i Västra Götalandsregionens storkök, Hanna Heikkilä och Åsa Svensson

2007:04 Konsumenters köp av ekologisk mat - En forskningsöversikt, Ulrika Holmberg, Hulda Steingrimsdottir och Åsa Svensson

2007:05 Between research and politics - The concept of "sustainable consumption" in Scandinavian research, Oskar Broberg

2007:06 Fika, fiske och föreningsliv, Helene Brembeck, MariAnne Karlsson, Eva Ossiansson, Helena Shanahan, Lena Jonsson, Kerstin Bergström och Pontus Engelbrektsson.

2006

2006:01 Ung konsumentmakt i en varumärkt värld, Sandra Hillén

2006:02 Unga konsumenter - en forskningsstudie av satsningen "Ungdomars arbete med konsumentfrågor. Kun(d)skap är makt, Barbro Johansson

2006:03 Konsumtionsforskningens inriktningar och förutsättningar, Ulrika Holmberg, Carina Ejdeholm

2006:04 Nordiska barn bilder av mat och ätande, Barbro Johansson (red)

2006:05 Maten och det nya landet, Helene Brembeck, MariAnne Karlsson, Eva Ossiansson, Helena Shanahan, Lena Jonsson, Kerstin Bergström och Pontus Engelbrektsson

2006:06 Design med omtanke - ekonomisk konsekvensanalys av två förskolor, Peter Svahn

2005

2005:01 Elusive Consumption in retrospect. Report from the conference, Edited by Karin M. Ekström, Helene Brembeck

Kortrapport 2005:01 Aktiemarknaden, premiepensionen och aktiefondsval, Henrik Svedsäter

2005:01a Brokiga bilder av barns konsumtion. Hur barn och konsumtion framställs i några svenska medier, Barbro Johansson

2005:02d Kristen konsument. En forskningsstudie om projektet Schysst konsument, Barbro Johansson

2005:03 Maten och skolan - ett hållbar tänkande, Sandra Hillén

2005:04 Vin, växthus och vänskap. Rapport 1 från projektet "Den mångdimensionella matkonsumenten. Värderingar och beteende hos konsumenter 55+", Helene Brembeck, MariAnne Karlsson, Eva Ossiansson, Helena Shanahan, Lena Jonsson och Kerstin Bergström

2005:05e Att göra skillnad: en studie av projektet "Konsumentupplysning - rättvis handel", Eva-Karin Karlsson

2005:07 Guldkant och hälsofara. Om socker och barn i Vi föräldrar och Kamratposten 1969-2005, Barbro Johansson

2004

2004:01 Young consumer's credit related lifestyles and payment problems, den danske del av projektet, Jesper Olesen (på danska)

2004:02a Catwalk för direktörer. Bolagsstämman - en performativ perfomance av maskuliniteter, Magnus Mörck, Maria Tullberg

2004:02b Jag vill att det ska synas att jag bryr mig- unga män om sina klädstilar, Philip Warkander

2004:02c Det hänger på håret - maskulinitet, feminintet, makt, mode, konsumtion, Marie Nordberg

2003

2003:01 Alternative modeller for forbrugerbeskyttelse af børn, Jesper Olesen (på danska)

2003:01 (kortrapport) Kognitiva illusioner som lurar konsumenter, Tommy Gärling, Amelie Gamble

2003:02a Unga konsumenter på bostadsmarknaden, Niklas Hansson

2003:02b Man måste veta vad som händer! - En studie av ett konsumentupplysningsprojekt för unga bosnier i Sverige, Katarina Jonsson

2003:02c Att bli kritisk. En studie av informationsprojektet "Reklamen - påverkar den mig?", Jakob Wenzer

Centrum för konsumtionsvetenskap, CFK, bildades 2001 och är idag Sveriges största forskningscentrum inom konsumtionsområdet. CFK finns vid Handelshögskolan, Göteborgs universitet.

Vid CFK möts forskare från olika områden för att bedriva tvärvetenskaplig forskning om konsumtion och konsumtionsmönster. Forskningen bedrivs i tvärvetenskapliga forskningsgrupper, som också samarbetar med forskare vid andra universitet i Sverige och andra länder. Ett 30-tal forskare med bakgrund i olika vetenskapliga discipliner såsom design, etnologi, företagsekonomi, hushållsvetenskap, teknik och psykologi forskar om allt från mat och äldre, barn och konsumtion, genus och design till heminredning, samlande och bilresor.

CFK samarbetar med många olika aktörer på konsumentområdet exempelvis Konsumentverket, Konsument Göteborg, Västra Götalandsregionen och Sveriges konsumenter. Under perioden 2008-2010 får CFK ekonomiskt stöd för administration, kommunikation och forskningsinitiering från Miljönämnden och Regionutvecklingsnämnden i Västra Götalandsregionen.

Adress: Centrum för konsumtionsvetenskap, Box 606, 405 30 Göteborg

www.cfk.gu.se

GÖTEBORGS UNIVERSITET
HANDELSHÖGSKOLAN