ecoGator – a smartphone app building on the EU energy label

Kerstin Schilcher
Austrian Energy Agency
Mariahilfer Strasse 136
1150 Vienna
Austria
kerstin.schilcher@energyagency.at

Thomas Bogner
Austrian Energy Agency
Mariahilfer Strasse 136
1150 Vienna
Austria

Sophie Attali
Guide Topten
France

Keywords

appliances, energy label, behavioural change, app

Abstract

The main objective of this initiative – co-funded by the EU programme IEE and conducted by a consortium of 12 partners – is to support consumers in their purchase decisions by providing up-to-date information about the most energy efficient products on the market and by supporting consumers in leading an energy efficient and eco-conscious lifestyle.

The European wide "myEconavigator" campaign supports customers by providing easy to handle mobile accessible information based on our App ecoGator for the selection of highly efficient products on the market. ecoGator is the first app which can scan and process data from the EU energy label by using a smartphone's built in camera. Users simply point to the EU Energy labels attached on fridges, freezers, dishwashers, washing machines, dryers or TVs. After scanning the label a traffic light clearly indicates, if the product belongs to the most efficient 20 % of all products on the market, based on topten platforms' selection criteria. The ecoGator app is easy to use and can be accessed through mobile devices such as smartphones and tablets for product identification and in-store advice, covering the most relevant consumer decision-making criteria, namely: cost, product features and energy efficiency.

Furthermore, ecoGator provides a day-to-day mode which encourages the consumer through the integration of playful elements to lead a more sustainable lifestyle and to use the mobile application on a more regular basis (i.e. users are invited to put theoretical knowledge into practice by performing challenges which can easily be integrated into their daily lives, and is invited to try out a quiz to test their level of understanding).

In addition, smartphone optimized consumer web portals (10 national web portals) were rolled out in order to raise awareness of the benefits of energy efficient and sustainable products. This project specifically targets the online 'early adopters' and 'early majority' (also called internet natives) but will also serve the more than 70 % of European households that are connected to the Internet aiming at energy aware purchase decisions and effective change of user behaviour regarding every day energy use.

Introduction

The main objective of this initiative – co-funded by the EU programme IEE and conducted by a consortium of 12 partners – is to support consumers in their purchase decisions by providing up-to-date information about the most energy efficient products on the market and by supporting consumers in leading an energy efficient and eco-conscious lifestyle.

Our European wide "myEconavigator" campaign supports customers by providing easy to handle mobile accessible information sources based on our app "ecoGator" for the selection of highly efficient products on the market. Smartphone optimized consumer web portals (10 national web portals) roll out the "myEconavigator" campaign in order to raise awareness of the benefits of energy efficient and sustainable products while social media channels encourage users to share the information with friends and family. This initiative reacts to mainstream trends for smartphone use as well as for adoption social media like Facebook or Twitter and provides the roll out of the "ecoGator" smartphone app (available in Google play and in iTunes since October 2014). The ecoGator app is easy to use and can be accessed through mobile devices such as smartphones and

tablets for product identification and in-store advice, covering the most relevant consumer decision-making criteria, namely: cost, product features and energy efficiency.

The energy efficiency of many electric products has improved greatly in recent years, however, the range of products is increasing constantly and thus obtaining an overview on the energy efficient product market is getting more and more complicated. In addition, the way consumers access information has changed rapidly in recent years, this, in turn, significantly influences the purchase decision-making process. Easily accessible information published in the internet makes it possible for consumers to directly search and compare products, superseding sales advisory service in shops to some extent. Websites, online fora and blogs are now widely accepted and used by consumers for price and product comparison, as well as peer to peer exchange of user experience. New media formats, including web applications, that allow information sharing, interoperability and user-centered design are supporting next generation consumers to select sustainable and energy efficient products. However, consumers are often overwhelmed by the vast selection of products and thus do not know which device they should choose.

Background

HOUSEHOLD ELECTRICITY CONSUMPTION

The electrical energy consumption in the domestic sector has risen significantly for more than two decades (e.g. in Austria increase by 30 % within 1990 and 2006, since then almost stagnating). First of all raised saturation levels for appliances in households as well as demographic trends were effective as main influencing factors.

PURCHASE DECISIONS AND LACK OF SUFFICIENT GUIDANCE IN SHOPS

Current consumer research (Reisch, 2011) shows that in the case of consumer goods, 80 % of all consumer decisions are not rationally controlled. In these cases, the decision to buy is not cognitively developed, but taken on the basis of emotions and experiences. Behaviour is like a routine in many areas, embedded in complex contexts and determined by customs. In other words, consumers decide rational, but on an individual level. Another important consideration is that although many surveys show that people claim to be willing to pay more for appliances with higher energy efficiency, only some actually do so in practice, placing more value on other aspects such as the cost of the appliance, quality and brand (Banerjee and Solomon, 2003 in Gaspar & Antunes, 2011).

Only a very limited share of people are willing to or capable of investing a significant time for gathering information and comparison of different products prior to the purchase decision. More likely people will search for the cheapest price of a certain product, possibly preselected in a more or less arbitrary manner. Advice in shop is a crucial element in guiding consumers, but unfortunately quite too often sales personnel is not sufficiently trained or willing to explain the benefits of higher efficient (and sometimes more expensive) products. As a consequence the situation where thorough guidance of customers in shops takes place is definitely not common, as this service most likely, but still limited will be offered in specialist shops. The benefits of more efficient products in terms of

lower running costs and possibly higher product quality will be overlooked or underestimated. Major retail chains in the sector "electric and electronic products" are apparently understaffed; hence customers have to rely on information printed on product packages or on labels only. Situation in terms of appropriate customer information is even worse in the case of mixed food/non-food markets selling appliances as part of their assortments.

Especially young customers expect to find information concerning product purchase online or even by mobile access to the internet. Classic means of information, like printed articles, flyers, etc. are getting less relevant. This obvious trend is actually hitting the overall mainstream thus forcing market players to establish and promote appropriate information services online.

THE LONG TAIL OF DISADVANTAGEOUS (PURCHASE) DECISIONS

Appliances partly have long product lives – up to and beyond 10 years, depending on the product category. Inefficient products will cause high accumulated running costs.

The revised EU efficiency label improves the market transparency in terms of energy efficiency again; but will challenge the consumers' understanding of labelling classes and their interpretation regarding the product's life cycle costs.

CONSUMERS' PERCEPTIONS OF LABELS AND EFFICIENCY CLASSES

Learning from previous experience people will need some time to actually learn how to consider the information displayed on the label. As efficiency classes haven't been readjusted, thus new products will likely populate classes from A upwards, many consumer will expect no real improvement by choosing classes beyond A (being for very long time the best class available). For example only a very few consumers will expect a 40 % energy saving, choosing an A+++ fridge instead of an A+ (actually now representing the minimum efficiency standard stipulated by Regulation 643/2009). The revised labelling scheme for directional and non-directional lamps valid from September 2013 will again challenge customers to really understand differences in running costs and efficiency. The relatively newly introduced label for TVs covers an important section in consumer electronics section, but will have to be moved to the customers' focus.

GREEN COMMERCIAL MESSAGES VS. FACTUAL LABEL DATA

Despite this there is significant need for complementary measures targeting the choice. Considering the huge diversity of (non-standardized) product declarations and labels introduced by manufacturers on the market, uncertainty on different levels will challenge consumers making an informed decision.

It is very obvious that consumer risk confusion between official labelling schemes and multiple green commercial messages. Quite understandable consumers don't want to focus on efficiency only but would consider quality related aspects as well. Merging the levels of product features, efficiency and price in an easy accessible service, especially on the point of sale, even independent from sales personnel, will be seen as significant advantage and added value from the customers' view. Concluding from the aspects mentioned above developing and disseminating an easily accessible information service on EU level – meeting crucial requirements as high quality, neutrality, timeliness, will be obligatory to significantly increase the share of sustainable and energy efficient products.

PURCHASE OF EFFICIENT PRODUCTS AND EFFICIENT USE – NEED FOR DAY TO DAY BEHAVIOR CHANGE

Aiming at effective energy savings the purchase of efficient products is an important precondition. However the efficient use of appliances in day to day life is important as well. People e.g. need to understand how to enable power management features, to be aware that eco-programmes will take more time and thus save energy opposite to express programs, most likely consuming more energy but finishing sooner, and so on. To exploit the full potential of energy savings, efforts have to be made to effectively change energy use behavior as well. This support has to be helpful, relevant, low-threshold and easy to use, to be appreciated and accepted by consumers. Thus ideally guidance regarding selecting efficient products will be accompanied by specific advice for energy and cost efficient routine use.

The "ecoGator" App

To proceed with the project, the Austrian project partners Austrian Energy Agency and evolaris developed a questionnaire to assess user expectations concerning the "ecoGator" app as well as their generic smartphone and social media use habits. The questionnaire, including 24 questions with a processing time of approx. 15 minutes, was translated by all partners and implemented via an online survey tool. In total, 2,580 persons completed the survey, which was conducted from July to September 2013. The evaluation of survey results on the national level revealed that the app concept met the target groups' demand to a high extent and highlighted that cultural differences were perceivable, but insignificant. Overall according to the results of the survey, the concept for a pan-European smartphone app for energy conscious purchase and use of products was proven successful. Furthermore, the basic design and navigation concept were evaluated in a "Living Lab" framework in Italy (University of Roma), Belgium (Centre for User Experience Research) and at the premises of evolaris (Graz). The outcomes were included in the fine tuning of the functional specifications.

Generally, the mobile application "ecoGator" guides consumers on two different levels: the shopping assistance mode and the day-to-day mode.

- The shopping assistance (browse) mode provides functionalities which are designed to help consumers to make a purchase decision at the point of sale in regard to the most energy efficient products on the market.

- The day-to-day mode provides the consumer with playful elements (gamification) to motivate the consumer to lead a more sustainable lifestyle and to use the mobile application on a more regular basis.

SHOPPING MODE

In order to use the shopping assistance locally in a store, the application provides functionalities which are designed to help the user to make a purchase decision. For this purpose, the user is not only provided with access to Topten[1] products, the user

---

1. Topten is an independent international program to create a dynamic benchmark for the most energy efficient products.

has the ability to directly interact with an interesting product in store through scanning the EU energy label. ecoGator is the first app which can read and process data from the EU energy label by using a smartphone's built in camera. User's simple point the camera to the labels attached on the appliances. Through scanning the product label, information is transferred to the smartphone and checked if chosen product meets the Topten benchmarks. The app provides a list of up to date actual available best performing products based on the respective national Topten product lists. The user can directly compare the product features and energy consumption of the chosen appliances and shows data for best performing products in given category (TV 42/48 Inch screen size, On mode XX/YY Watt) providing an added value for comparison of different products. The topten product rating is performed by international Standards, declaration of goods and labels. Information within the database is updated constantly. As soon as standardized data for a product is available, it is entered into the database. For example, the Austrian Topten database is also available via the web portal www.topprodukte.at.

A personal watch list and shopping profile can also be created. Saving product information quickly and easily in the application and the possibility to compare it with a Topten product is one of the application's added values. The direct integration of products from a store into the application and checking Topten requirements represents a unique way to help customers making an informed purchase decision.

Based on the database of Topten within this application the user is able to search for energy-saving and high-quality products in following product categories:

- Lighting.

- TV.

- White Goods.

SCANNING FUNCTION

ecoGator is the first app which can read and process data from the EU energy label by using a smartphone's built in camera. Via the scan, the app calculates the cost of electricity and annual energy consumption of the respective product. The app offers a simple cost calculator for comparing different products (e.g. washing machines, A+++ resp. A class) evaluating total costs (purchase price and running costs for project lifetime) to assist eco-conscious purchase decisions (based on default settings). In addition, the scan result translates in a traffic light rating system and signals an efficient appliance choice.

The required scan feature had to work for Android as well as iOS platforms. Besides the required image recognition, the functionality also needed to be able to read out text from an image in order to process calculations with the retrieved data.

Challenges related to innovative key functionality "energy label scanner"

The app's innovative key functionality "energy label scanner" (being the first app on European level with this feature) represented indeed the unique selling proposition in promoting the app, since consumers are offered a very simple solution in really understanding the data on the EU label. Developing and testing of this app function has turned out be very challenging,

complex and time consuming. After several iterations aiming at improving the scanner performance, the label scanner works well for a big share of scanned labels, but still not for all labels or smartphone devices (especially for Android, where there is such a wide range of products on the market). Key success factors are the lighting situation in the shop as well as the specific label itself, provided by the manufacturer. It became obvious in the testing phase that for a significant share of labels delivered alongside the product, the standard layout stipulated in the respective labelling directives is not followed correctly by manufacturers. This implies that changes in regulation are needed to ensure correct dissemination of information, which would also be a beneficial effect for the app use.

Development and testing was done based on three app prototypes, with upscaled functionalities for Android and iOS respectively. Several beta versions have been made available and subsequently tested by all partners to minimize the number of bugs and problems.

Gamification Strategy

Games are part of day-to-day life. They entertain users while simultaneously modeling behaviors. The integration of game mechanics and dynamics to mobile applications can increase user engagement (Lichtenvoort, 2013). User activity and retention are improved by combining game design elements with non-game context. This phenomenon is called "gamification" (Zichermann & Cunningham, 2011). During the conceptual design phase of the "ecoGator" app, a central focus was placed on gamification elements. With a qualitative assessment (usability testing method) the gamification elements were tested in terms of motivation, understanding and ease of use. The results of the tests were considered in the development phase of the application.

Gamification is mostly defined as "the use of game-play mechanics for non-game applications" (Kapp, 2012). Gamification's main goal is to raise the engagement of users by using game-like techniques such as scoreboards, achievements or virtual currencies enabling the users to feel real ownership and purpose when engaging with tasks (Groh, 2012). The following section describes the underlying gamification strategy, and subsequently the core functionalities provided to the user.

CRITICAL SUCCESS FACTOR: ENHANCING THE APP USE ON FREQUENT BASIS

The consortium's decision to extend the app scope beyond the shopping assistant functionalities to further include "gamification" elements, which encourage the user to use the app on a more regular basis, has been proven crucial. Especially since purchase decisions are taken only a few times per year. All content related to energy saving tips, quiz or so called "challenges" makes it more attractive for users to use the app on a more regular basis, while at the same time gaining profound knowledge of how to make their homes more efficient even without buying a new device. Thus, several measures have been included providing an incentive for frequent use (news section, sharing activities on social media, reward system, price competitions, quiz, etc.).

Hence a gamification approach has been developed in detail to maintain the users' interest for the app on a sufficient level

and to convey information related to energy conscious behaviour in an attractive way.

A general reward system was chosen, providing the user with gamification elements to motivate and conduct a more sustainable lifestyle (Zichermann & Licher, 2013). The most appropriate concepts are points, levels (leader boards), challenges and competitions. Through the collection of points the user should be motivated to reduce the ecological footprint of his or her household. Additionally the users advance to different level statuses according to their specific activities. To encourage households to become more eco-friendly, specific categories in the "ecoGator" application provide additional information required for a deeper understanding on how to save energy and lead a sustainable lifestyle. This additional information is revealed to the user in form of tips and hints. At the end, the user will be quizzed on the content just read. Thus, users are able to test their achieved knowledge assimilation by answering questions relating to the content. In addition, the user is invited to rate if the tip was beneficial or useful to them. This provides feedback for the applications provider as well. A personalized "favorite list" also enables the user to save and collect the most interesting tips. Afterwards, the user is invited to put theoretical knowledge into practice and perform weekly and/or monthly challenges, which can easily be integrated into their daily lives. This enables the users to put everything they have learned into practice. Alternatively, users are invited to try out a quiz to test their understanding of saving energy in the household. Each quiz consists of randomized questions from different thematic fields. After the user answers a question, the solution is displayed in the form of an explanatory text complemented by a useful tip. The emphasis lies on the fun factor to sustain and enhance the users engagement and motivation. Through these gamification elements the app attempts to have an impact on behavior change.

Application objectives in reference to behavior change:

- encourage users to improve their image of sustainability

- ensure regular use of application due to encouraging activities.

- User values of use in reference to behavior change:

- improve knowledge in terms of energy saving

- decrease ecological footprint of household

- compete with other users and friends

- win real prizes via ecoGator challenges (at certain intervals).

Conclusion

Users' behavior shows that the "ecoGator" is very well suited as a shopping assistant, and this can be considered its major strength. Tracing energy consumption and suggestions through serious-game missions on how to perform better is aiming to make the "ecoGator" app into a powerful tool for disseminating energy-saving lifestyles[2]. Up until February

---

2. In November 2014 the app "ecoGator" was awarded by Austria's leading technology portal futurezone.at with "App of the year 2014". ecoGator was one of 10 nominated apps, which were shortlisted by a user voting and selected by an independent expert jury, highlighting the aspects of innovation and service level.

2015, approximately 12,000 users have installed ecoGator on their smartphone.

During the testing phase of the EU energy label scan, it became apparent that a significant share of labels delivered alongside the product, the standard layout stipulated in the respective labelling directives, was not followed correctly by manufacturers. This issue needs to be investigated further and is important feedback for the future development of policy instruments (revisions of directives).

References

Gaspar, R. & Antunes, D. 2011. Energy efficiency and appliance purchases in Europe: Consumer profiles and choice determinants. Energy Policy 39, 7335–7346

Groh, F. 2012. Gamification: State of the Art Definition and Utilization. In *Research Trends in Media Informatics*, Institute of Media Informatics, Ulm University, 39–45.

Kapp, K. M. 2012. *The Gamification of Learning and Introduction – game based methods and strategies for training and education*, Pfeiffer, San Francisco.

Lichtenvoort, D. 2013. *Video Game Element incentives in Cross-Functional Enterprise Information System*, Germany.

Reisch, L. 2011: Konsum und Energie – Ansätze für eine verhaltensorientierte Energienachfrage (Presentation held on the final event of the project "Outlook Life Style 2030 – Determinanten für den Energieverbrauch in österreichischen Haushalten")

Topten, 2014. www.topten.eu, Topten International Group, France.

Topprodukte, 2014. www.topprodukte.at, Austrian Energy Agency, Austria.

Zichermann, G. and Cunningham, C. 2011. *Gamification by Design*, O'Reilly Media, USA.

Zichermann, G. and Linder, J. 2013. *Gamification Revolution – How leaders leverage game mechanics to crush the competition*, USA.