

My Home – analysis of the easy and intelligent way to save energy

Göran Wilke
Head of secretariat
The Danish Electricity Saving Trust
Denmark
gw@elsparefonden.dk

Keywords

common standard, control and monitoring devices, energy management system, energy savings, home automation, indoor environment, intelligent home, My Home, web portal

Abstract

The concept of the intelligent home is not new, but translating theory into reality presents many challenges. Launched in Denmark in October 2008, My Home is an interactive web portal offering consumers the opportunity to calculate their household energy consumption, receive advice on possible savings, and control and monitor their indoor environments by managing their energy consumption appropriately.

This paper describes the software functionality of My Home and examines the energy saving benefits available to consumers who use this system to control and monitor electricity consumption in their homes. The paper further discusses the necessity of having a common infrastructure and standard for use by all producers and suppliers in order to ensure a mass market for compatible equipment and solutions.

The analysis focuses on how My Home allows users to map energy consumption in their homes by using drag-and-drop icons to organise and equip a floorplan with their own electrical appliances. My Home features a calculator which automatically works out the annual electricity consumption and displays appropriate savings advice based on manually inputted readings or remote readings supplied by an electricity provider. Detailed statistical evaluation of metered values is also available. The extent to which the use of My Home has resulted in lower energy consumption in the homes of individual users is currently being determined by ongoing research. This involves examining

users' motivations and needs, and testing for usability on the basis of ethnographic field work.

The results showed that My Home facilitates easy configuration of home control and monitoring systems, which is normally very difficult to perform.

Introduction

European consumers can save billions of Euros – simply by making sure that appliances in their homes only consume electricity when actually in use. The secret is to eliminate unnecessary standby consumption and ensure that lighting, ventilation, heating systems and air conditioners only operate as and when required. One way of achieving this is for consumers to use correctly programmed home control and monitoring systems.

Launched in Denmark in October 2008, My Home is an interactive web portal offering consumers the opportunity to calculate their household energy consumption, receive advice on possible savings, and control and monitor their indoor environments by managing their energy consumption appropriately.

This initiative by the Danish Electricity Saving Trust (Elsparefonden) establishes a common platform for developing the green IT market, one which puts customers in a strong position, and also allows for accumulated data on homes to be collected under a single roof. A unitary digital and standardised description of buildings, equipment and machinery, and consumer trends will easily enable service providers to offer expert advice on a very cost-effective basis. Simultaneously, wireless and internet connectivity will be a launch pad for new business concepts in situations where home owners could entrust tasks like surveillance, operation and control to external players.

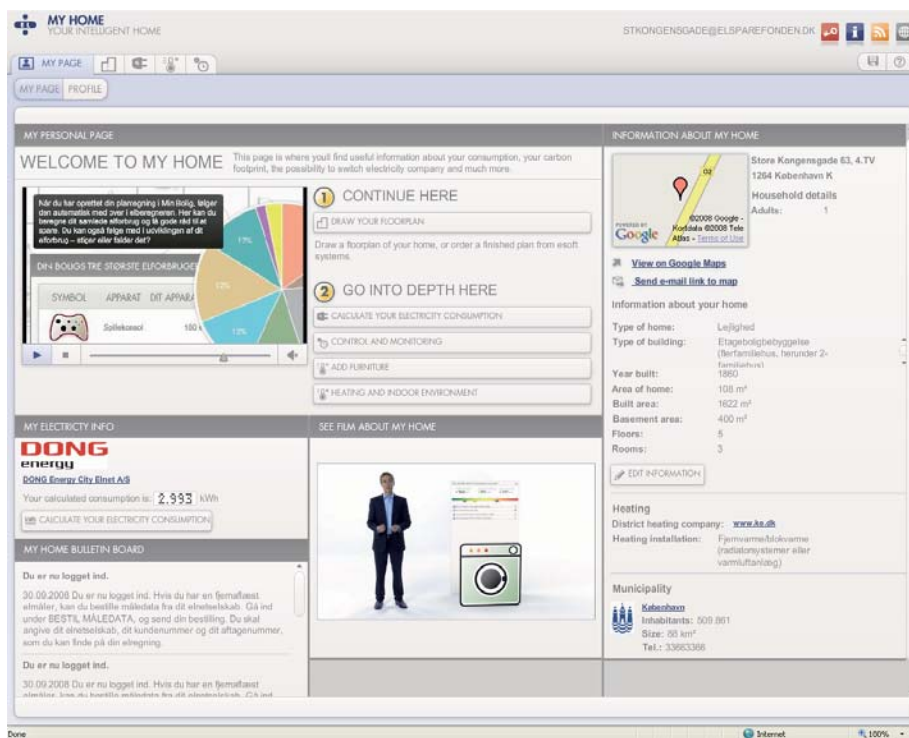


Figure 1. My Page

My Home currently allows users to draw a floorplan of their home and equip it with electrical appliances and furniture. Options for controlling and monitoring electrical appliances in various rooms of the home can then be added to the floorplan via a simple internet browser, which consumers can access wherever they are. One aspect of the My Home initiative is that the Trust wishes to encourage consumers to purchase energy saving devices covered by the Trust's Energy Saving Label.

This paper describes the software functionality of My Home and examines the energy saving features and benefits available to consumers who use this system to control and monitor energy consumption in their homes. The paper comments on the necessity of having a common infrastructure and standard for use by all producers and suppliers in order to ensure a mass market for compatible equipment and solutions. Subsequently the paper will elaborate on this description of the concept by investigating the responses to the software tool and examining the usability of My Home in terms of a 'walkthrough' usability test. One interesting development which puts this into perspective is the launch of the Nokia Home Control Center. Developed on an open platform, this device is a type of router which allows users access to integrated solutions such as My Home. In future, the Nokia Home Control Center will be able to act as the physical link which allows consumers to control and monitor their energy consumption via My Home.

The My Home concept

Today, IT is responsible for 2% of global CO₂ emissions. But homes account for an even greater share of the global environmental balance sheet with approximately 1/3 of Europe's energy consumed in these environments. We therefore cannot ignore

the fact that homes present one of the key challenges in the overall efforts relating to energy and climate.

My Home is an integrated internet portal for private homes and the backbone of the intelligent home. My Home allows users to draw a floorplan, install appliances and furniture, view current energy consumption and get advice for saving more energy by replacing appliances or using them in a more energy-efficient way.

The My Home concept is a software platform expressly designed to help consumers control and monitor the amount of electricity used in their homes. My Home is a significant first step to saving electricity in that it makes electricity consumption visible and helps consumers to become aware of exactly how much, and the ways in which they use electricity, thereby transforming their behaviour. The My Home concept encourages consumers to adopt sensible habits by using equipment and appliances in the most energy efficient manner.

Users can control and monitor their home appliances and devices even when they are somewhere else. They can also program automatic systems to control all their appliances and equipment for which logical rules can be defined. For example, this could involve controlling the indoor environment based on whether anyone is in the house or not, switching on the heating in their second or holiday home, or switching on the patio lights from a mobile phone. Central control and monitoring allows users to optimise their home's energy consumption while monitoring the building and receiving reports as required. Users also have access to invaluable statistics about their home's energy consumption, and thus have a good basis for determining how 'green' a life they are living.

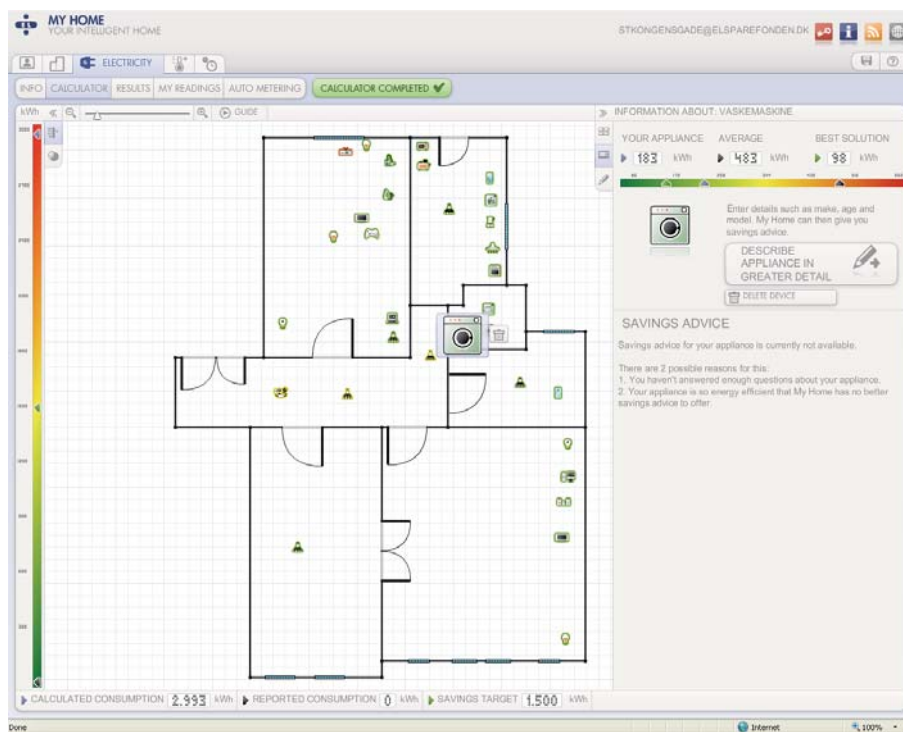


Figure 2. The floorplan with appliances

LEADING EDGE SOFTWARE FUNCTIONALITY

Figure 2 illustrates and explains the core functions of My Home.

To begin the process of creating an intelligent home users create a floorplan in their My Home profile which they can save on a dedicated website. My Home offers several options for doing this. Users can use the built-in drawing tool to draw a floorplan of their home. Alternatively, they can scan in an existing floorplan, or choose one of several demo layouts of various standard homes such as homes for a family with children, a retired couple or a single person. If users choose one of the demo homes, My Home will automatically suggest a range of electrical appliances for the home. Naturally, users can change the standard selection to suit their individual circumstances.

My Home includes a tool for metering electricity and calculating the electricity consumption. The more users tell My Home about their electrical appliances, the more detailed the overview and the better advice they receive. Users can select relevant appliances and drag them into the rooms of the house on the floorplan corresponding to approximately the same location occupied by the appliances in real life. The system's built-in calculator keeps track of the standard consumption for all appliances. As information about consumption patterns and the use of various products is entered, the system provides an increasingly precise estimate of annual consumption. My Home identifies energy wasteful equipment and advises on alternative solutions that offer the same performance but use less energy.

My Home also provides a home control and monitoring function that makes it possible get an overview of the home and access equipment in the home. In order to use this function consumers need a Master Controller, which is a small intelligent computer which manages their homes. For example, a user can check if the humidity level is too high, if the children's bed-

room is poorly insulated, or even whether there are uninvited guests when the user is away. My Home is the backbone of the intelligent home. However, because the market for intelligent wireless is growing rapidly, the Trust wishes to ensure that the different technologies can communicate together in a cost effective way from the consumer's point of view.

Homes – the blank areas on the IT map

Enabling different technologies to communicate together in this way presupposes one thing: that we have a standardised way of describing our homes; a single 'digital' culture which allows us to share know-how, conduct research and design solutions based on a common set of principles.

The problem, however, is that we still lack this common 'language' for describing homes, regardless of whether this involves the layout, the outer construction shell, materials or energy equipment. At present, there are no standard concepts for intelligent homes which address the multiple issues of comfort, indoor environment, energy and security.

Cost and user-friendliness are major obstacles to installing efficient private home control and monitoring systems. However, the market is currently in a transition phase with many manufacturers now supplying devices to private consumers. Many of these devices support the Z-Wave standard, allowing them to communicate with each other, irrespective of manufacturer (The Danish Electricity Saving Trust, 2009/2; Zensys, 2007).

The Trust hopes that its support of the Z-Wave standard will help eliminate these obstacles by offering consumers a common standard for controlling devices without tying them to one manufacturer. In order to achieve this, the Trust requires that the devices comply with the terms of its Energy Saving Label, which generally ensures both uniformity and compatibility, but



Figure 3. The Energy Saving Label for wireless devices.

also guarantees energy efficient solutions for consumers that are both user-friendly and easy to set up and configure. To date the Trust has approved 5 of these control devices, and there are many more on the way (The Danish Electricity Saving Trust, 2008/2; 2009/3).

ENERGY SAVINGS AVAILABLE TO CONSUMERS

The environmental benefits of an intelligent home are self-evident; automated control saves energy simply by not wasting resources. In an intelligent home, energy (e.g. standby consumption, lighting, etc.) is automatically saved wherever possible – without compromising comfort or the quality of life. By helping consumers to become aware of exactly how much electricity they consume and how they use it, My Home is a significant first step in terms of transforming consumers' attitudes and behaviour to electricity savings

Nevertheless, if homes are to be heated, and electricity consumption reduced in the years ahead, it is not enough to rely on behavioural campaigns and increased taxes on energy. We also need to introduce smart concepts which will facilitate the identification of weak points in individual homes and ensure the implementation of the right solutions in a cost-effective manner.

My Home attempts to address these issues by providing users with an overview that both identifies energy wasteful products and suggests more efficient alternatives, and encourages a greener lifestyle.

My Home and Usability

The Trust's vision for My Home involves the creation of a useful free software tool which appeals to the general public. By collecting home-related topics together under one roof, My Home offers the best starting point for home control and monitoring – as opposed to a toy for energy buffs. The Trust wants to listen to users, and to grow with them and with the technology, because The Trust knows that more intelligent homes are also greener homes.

One way to find what users want and whether they can navigate round the system appropriately is to investigate responses to the platform to see if My Home is meeting their requirements, and examine the usability of the system in terms of a 'walkthrough' usability test. A 'walkthrough' or 'key task' test is a cognitive method which involves asking the user to do something and then watching what they do, and how well they perform the task (Krug, 2006:144; Wharton et al, 1994:105,107).

THE WALKTHROUGH TEST

Testing for usability is a way of looking at values associated with My Home from a user perspective. Using this type of ethnographic field work in Danish homes¹, the Trust has discovered four different types of motivation and needs associated with the use of My Home² under the following types:

- Green users
- Convenience users
- Financially-motivated users
- Technical users

Responses from the four different types of users

Green users:

- “My Home should help me get an overview of how I can reduce my energy consumption. It would be brilliant if it can help me to see the total CO² emissions as a result of my actions.”
- “If My Home helped me to become greener I wouldn't even think about the reason for using the tool. I would just think: Goodness, how cool!”

Convenience users:

- “If I am going to use My Home, then I have to get some benefits from it. Not financially, but to make my everyday life easier. Otherwise I wouldn't have time for it.”

Financially-motivated users:

- “It's very ingenious, especially if I can use it for more than simply calculating how much electricity I use. It has to be easy and it's very important that others do the work for me. They have to provide me with all the information.”
- “My Home needs to provide me with concrete advice on how I can save money as quickly as possible. Preferably in actual figures. It should be like a calculator – it represents facts and quick and correct answers.”

Technical users:

- “It's not enough for me to get some advice on how to save electricity. I like new tech stuff and My Home should tell me all about the latest home control devices. It would be great if the Trust demonstrated new gadgets that I can use.”
- “The most important reason for persuading me to use it would be that I can play with it” (Schlesinger, 2008).

1. The field work was based on a combination of a home interview and usability test, followed by a second usability test at a later date. The first test involved 8 persons and combined an individual home interview and a usability test of the application. The interviewer guided the interviewee through a walkthrough test, which included tasks such as walking around the interviewee's home to identify the potential for installing home control devices. The second usability test conducted at a later date involved 8 new persons testing a newer version of the system. This paper only focuses on the results of the first test session.

2. The usability test is based on a beta, not the latest, version of My Home. The test was one element in the development process for making My Home user-friendly.

In general, it is important that the different needs of all the above types of users are fulfilled in terms of ease of access. It is of paramount importance to users that My Home is extremely user friendly and offers very specific benefits and results – otherwise they won't use it. The users also find it extremely valuable that My Home provides as much information as possible (rather than the other way round).

Users like the home control and monitoring functionality

Users are favourably disposed towards the different control and monitoring scenarios which have been introduced. Home control and monitoring is popular for different reasons:

- It makes your everyday life easier (comfort)
- It's cool to use (gadget)
- It helps you to act in a greener manner

The value of home control and monitoring is that it helps individual consumers to act in a greener manner in terms of energy consumption, without investing a lot of time and personal energy on learning what is required to act appropriately: "All three scenarios are very appealing, especially direct control. I need that immediately. Controlling your heating by remote control is very ingenious. I just hate to come home to a cold house. I would definitely LIKE that and would use it every weekend" (Schlesinger, 2008).

The current level of consumer interest in home control and monitoring emphasises the importance of establishing a common communication standard.

MY HOME WINS ADOBE AWARD

Between more than 700 projects submitted for the Adobe MAX Award. The users crowned My Home as the winner in the Envision category at the annual MAX conference which took place in Milan 1-4 December 2008. Adobe MAX Awards is a global awards program that recognises the most engaging user experiences on the internet created with the help of Adobe technologies. Every year Adobe hosts a series of conferences with the purpose of bringing together, developers and decision makers over 4 days of inspiring workshops, networking and sneak peaks into technologies of the future. The events are also an opportunity to applaud individuals and organisations that have created unique experiences for end-users (Adobe MAX, 2008). Votes were registered online, which is an approval from the actual users that they like the concept and the functionalities.

Conclusion and perspectives

The My Home concept facilitates easy configuration of home control and monitoring systems, which is normally very difficult to perform. The platform appeals to 4 different types of users identified by the research, namely: green users, convenience users, financially-motivated users, and technical users. Consequently the target groups can be defined as broadly-based. But there is still more functionality to be added which was identified by the research.

FUTURE ASPECTS

Additional functionality to encourage users to visit My Home:

- Emphasise the green aspects of My Home by making it possible to calculate a user's total carbon footprint and indicate specific actions on how to reduce it.
- Make the innovative elements of home control permeate My Home by offering support and consumer-friendly packages of home control and monitoring devices.

How to encourage users to revisit the website:

- Applications in support of daily activities of users in relation to the core services provided of My Home, e.g. green shopping for environmentally-conscious users, or having all relevant documents about a home stored on the website for convenient access at a later date (Schlesinger, 2008).

FUTURE PERSPECTIVES

The launch of the Nokia Home Control Center is a major step in the direction of intelligent home control and the necessity of a common standard. Developed on an open platform, this device is a type of router which allows users access to integrated solutions such as My Home. In future, the Nokia Home Control Center will be able to act as the physical link which allows consumers to control and monitor their energy consumption via My Home. The Trust expects that Nokia's new initiative will pave the way for even greater growth in the market for wireless equipment and devices which can control and monitor the home, thereby allowing consumers to save considerable amounts of electricity.

Collectively, Danes will be able to save up to 3 million kWh by managing their homes intelligently, which is equivalent to 1.5 million tons of CO² – or nearly half a ton of CO² per household. The combination of My Home and intelligent control and monitoring can therefore help Denmark to take a big step on the way to a leading position in intelligent home control and energy savings in the months up to the United Nations Climate Change Conference, COP15 Copenhagen, in 2009.

The Trust's mission is to help consumers save electricity. But it is equally important to encourage producers, wholesalers and the retail trade to develop and offer energy efficient products. This is why we are delighted to know that the business world is becoming aware of demands by consumers for wireless equipment in their homes. The Trust can already observe a considerable interest in the market for the opportunities provided by My Home for companies to develop products for the intelligent home.

References

- Adobe MAX (2008): Welcome to MAX 2008 Europe. <http://max.adobe.com/eu/experience/#?s=0&p=0> (first accessed 11.01.2009)
- Krug, Stephen (2006): Don't make me think. A common sense approach to web usability. New Riders.
- Schlesinger, Katja Øder (2008): The values of My Home from a user perspective. Learnings from fieldwork explorations in Danish homes. Home control and energy savings conference 01.10.2008

The Danish Electricity Saving Trust, (2008): My Home. <http://minbolig.elsparefonden.dk/> (first accessed 26.12.2008).

The Danish Electricity Saving Trust, (2008/2): The Energy Saving Label defines requirements for energy efficiency. <http://www.savingtrust.dk/consumer/products/energy-saving-equipment/wireless-equipment/energy-saving-equipment> (first accessed 07.01.2009).

The Danish Electricity Saving Trust, (2009/2): Common standard. <http://www.savingtrust.dk/consumer/products/energy-saving-equipment/wireless-equipment/common-standard> (first accessed 09.01.2009).

The Danish Electricity Saving Trust, (2009/3): Find wireless equipment. <http://www.savingtrust.dk/consumer/>

[products/energy-saving-equipment/wireless-equipment/find-wireless-equipment](http://www.savingtrust.dk/consumer/products/energy-saving-equipment/wireless-equipment/find-wireless-equipment) (first accessed 09.01.2009).

The Danish Electricity Saving Trust (2009): Electricity Saving Trust enthusiastic about Nokia Home Control Center http://www.savingtrust.dk/news/consumer/nokia-home-control-center/index_html (first accessed 06.01.2009).

Wharton, C., Rieman, J., Lewis, C. & Polson, P. (1994): "The Cognitive Walkthrough method: A Practitioner's Guide. In Nielsen J. & Mack R. L. (eds.): Usability Inspection methods. John Wiley & Sons.

Zensys (2007): Z-Wave. <http://www.z-wave.com/modules/Z-Wave-Start/> (first accessed 14.01.2009).