Behavioural Design in EcoGrid 2.0

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EcoGrid 2.0 is a research and demonstration project funded by EUDP (Energiteknologisk Udviklings- og Demonstrationsprogram). The 9 partners in the project are:

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In Denmark, we have an ambitious goal of becoming 100% independent of fossil fuels by 2050, and in relation to Bornholm it is already by 2025. Achieving this requires a major change. Change of the industry itself and of us, the consumers. We have to adapt everyday behaviour, routines and habits to match the supply of green energy, display more flexibility and enable new technologies to successfully enter our households.

Changing everyday habits and behaviours is exactly the objective for Krukow to be a partner in the EcoGrid 2.0. A development and demonstration project, hosted by Danish Energy, seated in Bornholm, represented by 1,000 households and focused on making flexible energy consumption and everyday interactions with energy products & services easy. Our purpose and job is through applied behavioural science and behavioural design to develop efficient and convenient user journeys and communication tools, and together with the 8 other partners translate smart grid and future market mechanisms into consumer–friendly energy products, platforms and services.

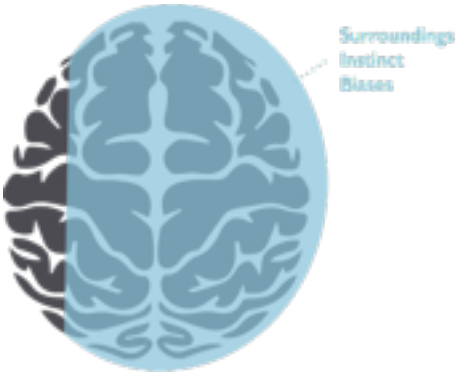
This report is a brief description of our approach, solutions and conclusions on EcoGrid 2.0, so far.

2. Theory and strategy

What is behavioral design?

Behavioural Design is a concept and approach that has its roots in behavioural economics, cognitive psychology and design thinking. An approach looking to influence key-decision moments and everyday habits, which relate to a challenge like implementing flexible consumption patterns. It is an approach based on an acknowledgement that most everyday decision - up to 90% - are based on instant and irrational impressions rather than rational thought processes. Impressions provided by our surroundings and peers in key-decision moments, leaving everyday decisions to be determined by "choice architecture" (the surroundings and procedures integrated into key-decision moments.) In the EcoGrid 2.0 key-decision moments are to be found in the private households and related to situations, in which the end-users should prepare to leave the control of the indoor temperature to an external aggregator and therefore change every habit related to heat pumps. When seeking to change those habits, our behavioural design method is key.

To foresee and take irrational and instant decisions into consideration when developing solutions, our behavioral design approach in Krukow is an approach using observations and interaction data to determine and describe the starting point, the existing patterns and barriers on the end-user side. This allowed developers to solely focus the development around redesigning small "cues & guides" in the existing environments and systems rather than introducing completely new, full services and often costly solutions. To understand cues and guides we have to take a look at the human brain. It evolved over thousands of years within a simple environment, something akin to the African Savannah, on which vital things necessary to survive (danger, food, shelter, water, etc.) were represented simply by recognizable cues and guides and were easily understood.



90% of human behavior is automatic

The KRUKOW Approach

In EcoGrid 2.0, we look for cues and guides within the environment of the endusers; Analyzing offline and online environments to map out, which cues and guides have been designed or are missing or need to be redesigned, systemically scrutinizing the choice architecture within any physical or digital environment.

In order to map, document and determine the effect of any new cues and guides, behavioural design offers a test-based approach. Rather than using evaluations from subjective interview methodologies, we are documenting irrational and unconscious patterns by the collection of interaction data or/and observations.

To accommodate this approach, we use a three-step method for the development of EcoGrid 2.0 solutions:

1. A behavioural mapping process, by which we collect interaction data and insights on existing choice architecture and map out barriers keeping flexible consumption patterns to accrue.
2. Based on the mapping process, we point out behavioral design strategies to base the development and design/redesign of cues and guides upon.
3. A test phase, during which we test the actual effect and impact of prototypes representing new cues and guides.

Research and analysis

Krukows role in the EcoGrid 2.0 is to design and optimize the user journey and experience making it easy for the participants to succeed in fulfilling aggregator requirements of flexibility. More specifically, we are to give inputs and advise on how to conduct behavioural research, develop user-platforms and how to communicate aggregator products, in ways that are appealing to the participants. We provide project partners with visual and design based inputs on how to adjust existing and new consumer communication elements, platforms and products enabling the partners to keep the end-users engaged in the project.

To reach the objectives of the EcoGrid 2.0 and to understand the focus for our development process, we started by investigating and learning from the EcoGrid EUDP project and combined prior analysis and feedback from end-users with the new research done in the EcoGrid 2.0. This mean that we based our first round of development upon:

- Review of former EcoGrid EUDP reports describing customer interactions and feedback.
- International casestudies with a similar scope.
- End-user research and surveys undertaken by CBS and BEOF in EcoGrid 2.0.
- We sent out design probes to the end-users and received their inputs and co-created solutions and strategies with them.
- Facilitated end-user focus groups.
- Went through screendumps of prior user portals combined with support-call data to determine where the biggest flaws on the end-user side would appear.
- Collected and analyzed historical metredata mapping prior consumption patterns from the EcoGrid 2.0

We used these insights to map crucial barriers keeping the end-users from having the ultimate EcoGrid experience and displaying flexibility behaviors on a daily basis. By barriers we mean triggers or "crucial points" in online and offline environments that are either missing or/and designed poorly leading the end-users to making the wrong choices.

Based on prior studies and feedback from the end-users, we could tell that barriers like expert and technical language, heavy, text-based information, lots of different "looks and feel" in interface design should be avoided.

Instead, we focused our development on the integration of good feedback and reminder mechanisms, visual and light information, consistency in all visual and spoken language and on creating one end-user portal/ entrance for everything, making it simple for all participants to find their way around the EcoGrid universe.

This led us to focus our efforts on the following end-user oriented elements:

· **Newsletters:** E-mailed documents informing participants about the project objectives, technicalities behind the scenes, news and general updates. When starting the EcoGrid 2.0 we built the first round of newsletter prototypes on existing formats from the EUDP project.

· **Website:** Customer web sites and portals allowing the participants to interact with household settings and get in-depth information about the project. In the EUDP project, there were approx. 6 end-user platforms serving different purposes with different information usable for different moments.

· **Manuals:** Digital and physical instructions for participants to troubleshoot their equipment and website problems. Again we were redesigning on existing templates from the EUDP project.

· **SMS Services:** Helping participants to remember when and how to change their everyday routines, engage with the online platforms and make the act of changing aggregator products easy. Providing the end-users with direct-to-customer messages, which communicate feedback, support, or directives. Recommendations for SMS services were also built upon insights from similar services in the EUDP project.

· **Aggregator products:** Testing and trying out new ways of communicating and framing aggregator products making it relevant and attractive for end-users to change products according to project objectives. Aggregator products variating from HS1, HS2 through out HS3.

Design principles

To make sure we reached all project objectives and could point out aggregator products scalable for a global market, we focused the EcoGrid 2.0 strategies around the end-user journey by developing the following communication elements:

- Newsletters and SMS services
- Website and manuals
- Webportal and aggregator products

To ensure simplicity and convenience on the end-user side, we based the overall development on behavioral design strategies and principles tying together the different elements and strategies which work well with unconscious thought processes:

- **"Foot in the door":** A behavioural design principle using a structured information flow, by which information is presented in increasing levels of complexity based on the customer's experience level. Structuring the user journey so that information given moves from light to elaborate, making users able to better accumulate and translate information into behavioural changes.
- **Social proof:** A principle used to activate the basic human need to fit into and follow a pack. By describing positive peers' behaviour, we can activate the end-users towards flexible consumer habits.
- **Visual feedback:** A behavioural design strategy of providing the end-users with visual feedback in key-decision moments making target interactions on web platforms and in household situations, easy and convenient.
- **Reminder systems:** Helping the end-users remember and carry out online and offline tasks related to flexibility on an everyday basis, making sure energy consumption stays a top priority in a busy everyday life.
- **Framing:** Providing the end-users with messages displaying tasks or/and end-user favourable information making right decision more attractive.
- **Anchoring:** By displaying offers, services, and products in ways, which makes one seem more attractive than others, nudging the end-users towards the environmental choice.

Strategy of execution

To the process of measuring and documenting the success of our solutions, we furthermore adjusted and targeted strategies to each heating season:

HS1: Using HS1 to do the first round of tests related to small optimizations of the existing choice architecture and to do the first round of test on alternative services like different kinds of SMS services mapping out, to which extend existing web portals, newsletters etc. needed to be (re-)designed into a coherent user journey.

Deliverables for HS1:

- Prototypes and behavioural design strategies optimizing existing communication elements for HS1 including newsletters, manuals and website(s).

- New consumer features/services for test in H1: Three kinds of SMS services. Direct, feedback based and support driven.
- Outlining behavioural requirements for test, documentation, and data collection for HS1 prototypes.

HS2: For HS2 we wanted to test a more controlled user journey, sample and test two aggregator strategies: Reduce the complexity of the current platforms and combine smart-metre services from Greenwave and Siemens into one interface/webportal:

· A hands-on strategy allowing the participants to engage and actively take part in the control of household temperatures, and

· A hands-off strategy leaving temperature adjustments to the aggregator.

All of this to determine how much or little aggregator products should demand from the end-users, when it comes to engaging them in flexibility. The strategy for HS2 is also to run bigger samples and test end-user services allowing us to make final iterations before entering into the HS3.

Deliverables for HS2:

- Recommendations for end-user communication strategies.
- Introducing a new and coherent webportal allowing participants to easily access and operate EcoGrid services. A webportal introducing the two aggregator strategies in understandable ways.

HS3: For HS3 the goal and strategy is to introduce the participants to a choice allowing them to choose between products offering the participants added values in terms of cost reduction, environmental or/and community-oriented benefits. It is also important that we frame the communication so that it matches participants preferences.

Deliverables for HS3:

- 2-3 aggregator specific products allowing the participants to choose between cost, environmental or community-efficient products.

Design for the communication strategy

Apart from heating-season specific strategies we also introduced overall communication strategies:

- Making sure alle communication elements were aligned and "speaking" the same visual and written language.
- Reducing complexity in entry points, interfaces, and systems.
- Framing messages and products to match end-user preferences, making them relevant and attractive.
- Aligning information and feedback streams with the needs of the participants rather than the needs of project partners.

3. Solutions

The solutions in EcoGrid 2.0 are designed to match the needs of the end-users and their preferences and include newsletters, SMS services, websites and portals as well as aggregator products. Elements that, when put together and facilitated towards the end-users, create a coherent and consistent "journey" into the EcoGrid 2.0 universe and functionalities. In the following, you will find a short introduction to behavioral design solutions and insights behind these.

Newsletters:

In the EcoGrid 2.0, there are approx. 1,000 participants, who voluntarily signed up to join the programme for many different reasons; some for the sake of the environment, some for the sake of being loyal to a local project and some for the sake of being able to save money on the their heating bill.

In the EcoGrid 2.0 programme, newsletters are used to ensure communication from the aggregators to the participants. Providing them with regular updates and information of the progress of the project, feedback on their participation in the project, information on upcoming events and technical details or/and difficulties. All with the purpose of keeping participants engaged, motivated and on track regarding flexibility behaviors.

For EcoGrid 2.0, we developed a newsletter template using a strategy called "foot in the door" to frame and give information of different levels of details, depth and insights. We aligned the design of the newsletters to match the overall look of Ecogrid 2.0 making them visually consistent and in this way enhance the experience for the participants and make them feel safe because of the consistency. We adjusted the information given to better match their areas of interest: Moving from giving information about aggregators to talk more about households and everyday routines in relation to heating pumps. In the newsletters, we used colloquial language rather than expert language, added pictures of other people from Bornholm at the top of the newsletters in order to trigger the social affiliation to the messages in the newsletter, and marked CTAs with clear, bright colours and heavy typography, making it clear and easy for the readers where to click.

Our behavioral target for the newsletters were to increase the amount of newsletters being opened and CTAs (call-to-actions/links & downloads) being activated.

Newsletter template for BEOF

October newsletter example for BEOF

SMS Services:

A lot of the participants in EcoGrid 2.0 are elderly and not frequent users of internet services. However, they all have a smartphone and are used to interacting with this platform. To take the needs of as many participants as possible into consideration, we introduced a SMS service as part of the collective user journey. A service making it possible for aggregators to give participants instant messages in case of an emergency or/and a technical issue, thus reducing the amount of support calls in crucial situations. A service giving them feedback on interactions made online, making sure participant feel assured that they had done the right thing and directive messages helping them translate aggregator flexibility requirements into everyday actions. For example turning down the heat when the sun is up etc. For directive messages testing different wordings related to costs, community or/and environment in different heating seasons so we were able to determine, which framing works better when encouraging to interactions. Due to practical and technical issues, only directive messages will be tested in EcoGrid 2.0.

Websites:

In the EcoGrid 2.0, websites and portals serve the purpose of providing participants with a secure and simple way of interacting with their household and hardware. There are different types of households; Summer houses, villas, single households, and multiple households, making it hard for participants to stay on track with regard to setting flexibility tasks related to their households. In order to make these processes as convenient as possible for the participants, we created a joint web portal using a log-in code to detect the type of households the user has, default settings matching household hardware, imagery and icons to guide users towards the setting that will lead them to a more flexible behavior.

When logging into the new EcoGrid portal, the users are met with a sign-in procedure allowing us, the developers, to collect correct cellphone numbers and to determine the type of household they have. Information that also feeds into a personalized user profile available on the webportal allowing users to upload a profile picture, making the EcoGrid experience a bit more personal and engaging.

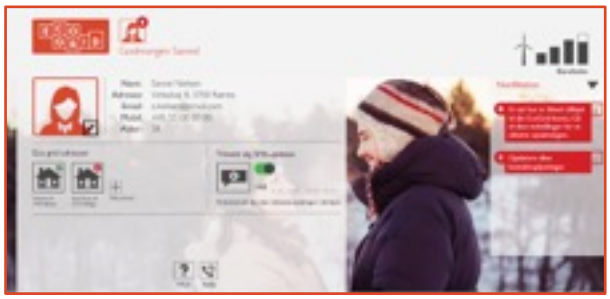
As you enter the site, several elements are dynamic and will change according to your settings and type of house hold: If you are elderly and living in a single household, the background picture will relate to your type of household and age; If you log in in the morning the profile text will say "Good morning"; If there are important notifications related to your local area etc., a drop-down menu will be unfolded providing you with the information you need. All of this to create a customized, forthcoming and pleasant experience for the users, keeping them motivated and engaged.

Once the users enter the portal, they are met with a visual overview where icons are used to represent their EcoGrid households. EcoGrid includes both villas and summerhouses, so in order to make it easy and tangible for the users to navigate, we have designed to types of icons allowing the users to clearly see the difference between a summerhouse or/and a villa depending on the kind of house, they have registrered. On each household icon there is a small visual indicator showing a green check mark or a red bell, which indicates the state of their hardware or/and consumption behavior. This is a feedback mechanism allowing the users to quickly see, if any action is required from their side.

If they have a green check mark, they can just log out or continue their EcoGrid experience by clicking onto their household, which will take them further into the aggregator site and reveal more options and functionalities. Functionalities, which have been adjusted to match the aggregator product, to which they are connected. If they have an aggregator with a "hand off" strategy, they will meet the option of clicking a "I am cold" and/or "I am warm" button. If they have an aggregator with a "hand on" strategy, they will meet a smiley showing them the state of their flexibility behavior combined with visual recommendations for actions that can help them improve their performance.

Apart from the above, the site offers aggregator services that the end-users are familiar with from the Greenwave and Siements hardware, such as an overview of energy consumption and the option of setting their house/summerhouse on "de-frost" mode.

Finally, also to take the fragility of some of the participants into consideration we also added a feature allowing summerhouse owners and elderly to add an administrator. For summerhouse owners and elderly people, keeping track of EcoGrid equipment and settings can be quite a challenge so this function allows people, who are away from their homes or need help, to hand over the control of their household and hardware to an external administrator without having to leave the project.



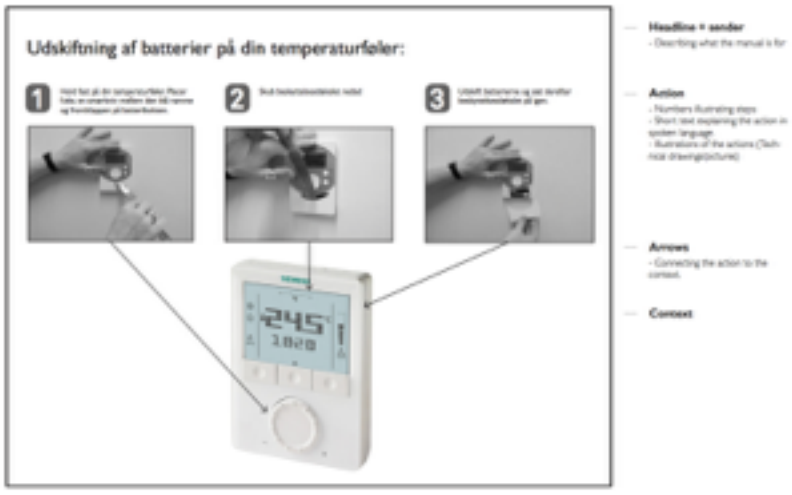
Web portal mock-up

Web portal prototype

Manuals:

In the EcoGrid 2.0, the manuals are used by the participants to figure out practical issues with their hardware either before or after trouble shooting with BEOF or by technicians when supporting participants.

To make the manuals as sufficient as possible, we have used pictures and illustrations matching real life settings to give the user a clear view and understanding of what steps that need to be taken.
To create recognizability, we made sure all illustrations demonstrate hardware from the same angle and we also eliminated as much text as possible and used only colloquial words, if any. And finally to make the manual accessable, we placed it on the front page of the website with bright colored headlines and buttons.



Example on manual frame work

4. Conclusion

In terms of working with behavioural design and designing flexible consumption patterns is a matter of making the right decisions for end-users easy. It is about creating a consistent and coherent user journey, providing good feedback and reminder mechanisms and usability in all products and services. When developing and designing such products and services, it calls for an elaborate research phase taking the needs of all users and potential barriers into consideration. In the EcoGrid 2.0, we found that the key to create a great EcoGrid experience and right behaviours was to give visual instructions rather than written, provide services that are accessable to various types of end-users and make communication tangible and relevant to the end-users.

Facing the upcoming HS2 we will be able to gather information and feedback on SMS services as well as data of the traffic on the new website, which will be launched at the beginning of HS2. Thus, we are not able to draw final conclusions but preliminary conclusions only as to principles rather than specific conclusions on the various products and services.

Read more at:

www.ecogrid.dk