BC Hydro Heuristic Evaluation

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Executive Summary

This usability study is guided and determined by the BC Hydro's five years plan to become a global leader in energy conservation and efficiency through promoting energy understanding and providing programs and incentives to encourage customers to use less power.

While the overall site design and appearance are in line with the current trends and look very modern, the team found a number of minor and major problems that we believe can impede the overall usability of the site and diminish user satisfaction when using the site.

Our study evaluated design in three major categories:

1. Visualizing Energy consumption

2. Team Power Smart Activities

3. Profile Management

Problems found ranged from minor, such as consistency in the way website links and buttons are used across the site, to more serious problems concerning users' ability to perform certain tasks.

Scenario

The MyBCHydro customer portal provides customers four main services: billing, visualizing energy consumption, Team Power Smart activities, and profile management.

The purpose of this heuristic evaluation is to identify usability issues, analyze their severity, and suggest recommendations to improve the user experience and satisfaction of the MyBCHydro web portal.

The most significant problems include users' inability to sign up for one of the programs that offers incentives and promotes reduction in energy consumption, difficulty in understanding the information presented by the system and making a connection with the real-world, and difficulties in navigating and understanding website forms.

Our recommendations for improvement suggest that the site should have better learning tools for users. These tools will enable them to translate the idea of energy consumption into familiar terms that they can measure and relate. We also recommend that the visualization tool should provide real-time data to the user, thus enabling the user to easily gain a deep understanding of the connection between the ways they use their electricity-powered devices and how they manage to consume so much energy. When they see where their energy actually goes, they can focus their attention on consumption reduction. Finally, we recommend that the site should be more engaging and provide more incentives and contextual information to the user based on their consumption behaviour, all with the goal of saving more energy.

This evaluation intends to provide insight to whether the system is able to achieve BC Hydro's desired goals and outcomes, which is to increase online customer interaction, promote energy understanding, and encourage conservation. This type of evaluation is effective because it finds the major usability issues. The disadvantage is that the evaluators come from a design background, opposed to the average customers. Because of this, the evaluators could potentially miss issues that a novice user may find difficult.

Methodology

Researchers

A team of three senior students in the Interactive Arts and Technology program at Simon Fraser University performed a heuristic evaluation of MyBCHydro web portal.

Methods Used

Three evaluators performed individual inspections of the MyBCHydro web portal. After, we reviewed our findings and provided a severity ranking for each usability issue. Jakob Nielsen's 10 usability heuristics and severity ratings provided a guideline for the evaluators when conducting their heuristics evaluation. The heuristics violated consisted of: 1. visibility of system status, 2. match between systems and the real world, 3. aesthetic and minimalist design, 4. user control and freedom, 5. help users recognize, diagnose, and recover from errors, and 6. consistency and standards. The test session contained four sections: two scenarios, A/B testing, and a debriefing. During the scenarios, participants were asked to think aloud – to verbalize their thoughts and actions.

Tasks

1. Visualizing Energy Consumption: The consumption data graph is a valuable tool to promote energy understanding and encourage conservation. The thinking is that if customers are aware of their energy consumption, then they are more likely to conserve energy. For this task, the evaluators want to see if they are able to understand the graph and easily use the filters to compare their energy consumption against different variables.

2. Compare your Home (Team Power Smart): The compare your home tool provides customers a visual comparison of their annual electricity use to similar homes in British Columbia. In this task, the evaluators want to accurately select their home profile options and understand the relationship between their household and comparable homes energy consumption.

3. Analyze your Home (Team Power Smart): Analyze your home applet creates a personalized energy report for the customer's home. The goal of this report is to identify the major energy consumers in the home and provide energy efficiency and money saving tips. In this task, the evaluators want to complete the form as quickly and easily as possible and be able to understand the report to support their energy understanding and conservation.

4. $75 Challenge and Power Smart Graphs (Team Power Smart): The challenge is to reduce household energy consumption by 10%. This challenge is important as it encourages the customers to conserve energy. The task is to sign up for the challenge, track their savings, and read the power smart graphs.

5. Setting Alerts (Profile Management): Users can set alerts to remind them to monitor their consumption and receive step 2 price notification. These alerts can encourage customers to track and review their energy consumption on a more regular basis. For this task, the evaluators want to set their alerts so they can get notified when their consumption is halfway to reaching step 2 pricing and be reminded to log in and view their consumption every month.

Below are 25 issues that we found significant: 1 critical severity issue, 5 serious issues, 9 medium issues, and 10 low issues.

Results and Interpretation

The evaluators of the MyBCHydro web portal found 27 heuristic problems while performing the five tasks. The heuristics violated consisted of visibility of system status, match between system and the real world, aesthetic and minimalist design, user control and freedom, consistency and standards, and help users recognize, diagnose, and recover from errors.

One problem can correspond to a single issue on a page, a repeated issue seen over multiple pages, or an issue that affects all pages of the portal. Each problem has been given a severity rating from 1 to 4 (1 cosmetic problem, 2 minor usability problem, 3 major usability problem, and 4 usability catastrophe).

Severity Rating	Task 1	Task 2	Task 3	Task 4	Task 5
Cosmetic (1)	0	1	4	0	2
Minor (2)	3	2	1	1	2
Major (3)	2	3	3	1	0
Catastrophe (4)	0	0	0	2	0

Usability Catastrophe

1. Cannot sign up for the $75 challenge.

All three evaluators were unable to sign up for the $75 challenge. There are no instructions or sign up button to activate the challenge on the members' tool box home page. Users have to navigate to the common questions page to find instructions. The instructions are not clear. It tells users to "select start now", but does not mention where we can locate the "start now". One evaluator was not eligible for the challenge because he did not have a full year of billing history at his current address. The challenge rules and regulation popup does not mention this condition in the eligibility paragraph.

This information could only be found on the common questions page.

Location: Team power smart members' tool box

Heuristic Violated: Visibility of system status. Lack of visible instructions and sign up button prevent users from signing up for the $75 challenge. Important conditions should be clearly stated on the challenge page to prevent users from going through the trouble of trying to sign up only to find out that they are not eligible.
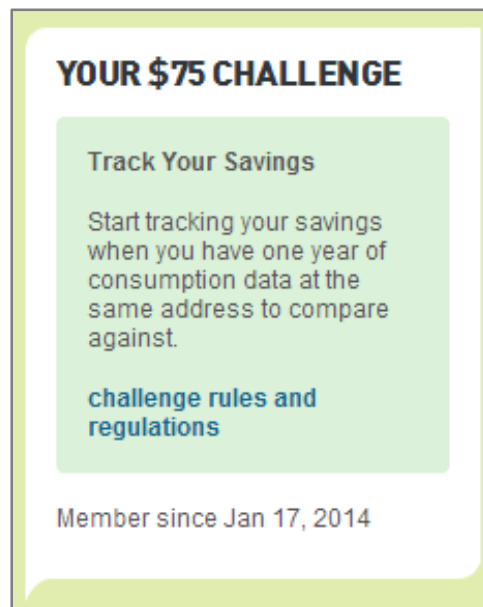

Figure 1 - $75 Challenge

Major Usability Problem

2. Difficult to understand Kilowatt hour (kWh).

Because energy consumption is not commonly discussed in daily conversations, it's difficult for the average energy consumer to understand the technical term, kilowatt hour. Although the description provided is accurate, users cannot connect this information to the real world. Kilowatt hour would not resonate with them and reinforce energy conservation.

Location: Energy consumption visualization tool

Heuristics Violated: Match between system and the real world. Use words/concepts familiar to the general public and create parallels to the real world to provide meaning of the data and support understanding.

Figure 2 - Consumption Graph

3. Accessibility and readability issues.

Analyze your home form opens in a small applet window which cannot be resized (occurs in Safari browser). The fonts are small that all three of our evaluators with good eyesight had difficulty reading the text and needed to increase the size of the page. There are too many questions written in technical terms that the average users or general public would find difficult to understand.

Location: Analyze your home

Heuristics Violated: Aesthetic and minimalist design. The design of the form and questions are difficult to read. Users become bored and tired when responding to the questions. Questions (e.g. type of ducts or insulation used) are often guessed due to the homeowner's lack of knowledge on the specific details of their home. Users are not sure if their analysis would be accurate because their responses might not be correct. Too much work that users lose the value of this analysis.

4. Analyze your home applet is difficult to navigate.

In analyze your home applet, all three evaluators found it difficult to navigate between the seven pages. If a user wants to make a change to a previous section, they could not simply select the section in the sidebar. Instead, they have to click on the, "exit [section].

Current changes will not be saved" link. This redirects the user back to the homepage, where they can select their desired section. This creates unnecessary steps for the user.

Users have to (1) exit the current section without saving their page. Or (2) complete the current section, proceed to the next section, exit the next section, land on the homepage, and then select their desired section.

Location: Analyze your home

Heuristics Violated: User control and freedom. The ability to navigate between the pages allow for smoother interaction. Users do not have to go through any additional steps to navigate between the sections.

Figure 3 - Analyze Your Home Applet

5. Help messages are not particularly helpful.

There are no visual cues beside the question or in the help popup window to support users' understanding of the question. For many users, this could be their first time they analyzed or inspected their house in detail. Many of these questions cover specific information of the house that many household owners are unaware of such as their water heaters or cooling systems. For section 3, question 12, "Do you have low-flow showerheads...?" An image of this kind of shower head beside the question or within the help popup would help users understand without conducting further search on Google images. Increase the efficiency and speed of their interaction.

Use words familiar to the user to support users' understanding of the question. Some questions, like section 6, question 4.6, "On average how many pages do you output per week?". Consider replacing a system-oriented term, "output" with a familiar word, "print".

Location: Analyze your home

Heuristics Violated: Match between system and the real world, recognition rather than recall. Visual cues (e.g. image of a programmable thermostat, or a desirable water tank setting) can help users answer specific questions.

6. Error message does not precisely indicate the problem.

Received error message, "account number must be a number". The error was due to the spaces between the numbers, not because they were not numbers.

Location: Link account page, account number text field

Heuristics Violated: Help users recognize, diagnose, and recover from errors. Error messages need to describe the problem accurately (e.g. account number must not contain any spaces) to help users quickly recover from the error.

Minor Usability Problem

7. Consistency issues for buttons and links.

The question mark in a circle icon is a button but does not resemble a button and does not look clickable. Depending on the page, to open the help popup window, different actions are performed by the user. On some pages, users click on the question icon. On other pages, users hover over the question icon. Some icons (question icon) are clickable and others (information icon) are not clickable. Both icons are similar in size and appearance, so users assume they share similar behaviours.

The hover state for "learn more" link is inconsistent. Only some links would be underlines when hovered over. Links should share similar behaviour to avoid ambiguity in the design.

The kilowatt hour icon that provides the explanation of kWh is not noticeable. It looks more like a symbol than a clickable element. The icon design is inconsistent with the rest of the help icons so users assume it is not a help item.

Location: General

Heuristics Violated: Consistency and standards. Provide visual cues (e.g. shade surfaces/edges) to make them stand out from the background and make these elements look clickable. To avoid inconsistency, make similar icons share similar properties. Users should not have to wonder whether these icons are buttons or symbols.

Figure 4 - Information and question icons

8. Lack of feedback when analyze your home report is being generated.

When the system is generating a report, the message, "Please be patient. The report may take up to 30 seconds to generate" appears.

However, sometimes the system takes longer than 30 seconds to generate a report.

And without appropriate feedback (e.g. progress bar), users are unaware of the current state of the system or if it is working properly.

Location: Analyze your home

Heuristics Violated: Visibility of system status

Suggested Improvements

We approached this usability study from the standpoint that BC Hydro's five year goal is to become a global leader in energy conservation and efficiency through promoting energy understanding and providing programs and incentives to encourage customers to use less power.

In line with the above, we suggest five changes to the design of the BC Hydro website that we believe can help BC Hydro achieve their goal and increase overall site usability and user experience. Changes are listed in the accordance with the overall impact they have on the previously stated goals.

Energy Consumption Visualization Tool

Having a tool that can help visualize energy consumption on such a website is a great idea but an idea that should be carefully executed with its target audience serving as the design centre point. The audience for BC Hydro's website is the general public with various backgrounds, different education levels and different understanding of technology and science. The web has changed and expanded beyond the realm of just the power user and this knowledge must be embedded into the design process.

All evaluators agreed that the energy consumption tool failed to present information in a user-friendly way and failed to provide sufficient information about energy consumption that would allow the average user to draw a meaningful conclusion when interacting with the system.

We recommend that the system be redesigned to use formal language that makes it easy to talk about, visualize and understand energy use.

On the Y axis of the graph energy consumption is illustrated and marked in kWh on the scale from 0 to 30. For the average user this information does not mean much unless they can understand what the kWh is and how it directly relates to their actions or energy consumption habits.

The current system only provides brief and not very useful explanation about kWh as it can be seen on the screenshot. In addition to being not very descriptive or useful, it is also hidden behind the "lightning bolt" icon which has the same blue color as the other non-clickable parts of the graph (such as bars) and can be difficult to notice.

Translating the kilowatt usage into real world application is not an easily accomplished task, but if properly executed it can help the user understand how energy works, how much different appliances contribute to the overall consumption and show opportunities for reduction.

There are some existing systems that can serve as good ideas. One such system is the "Home appliance Energy Use" visualization tool from GE. This interactive energy use chart shows how much energy various appliances use and how much does it cost to run those appliances on a daily or yearly basis. On the screenshot below we see a real world relation of how much is 1 kWh worth - "6 sitcom episodes on a Plasma TV".
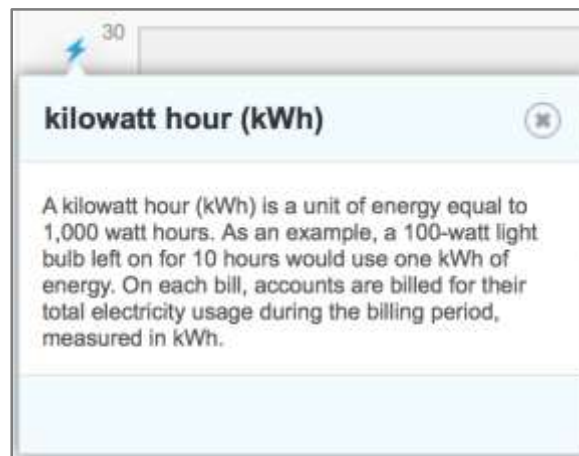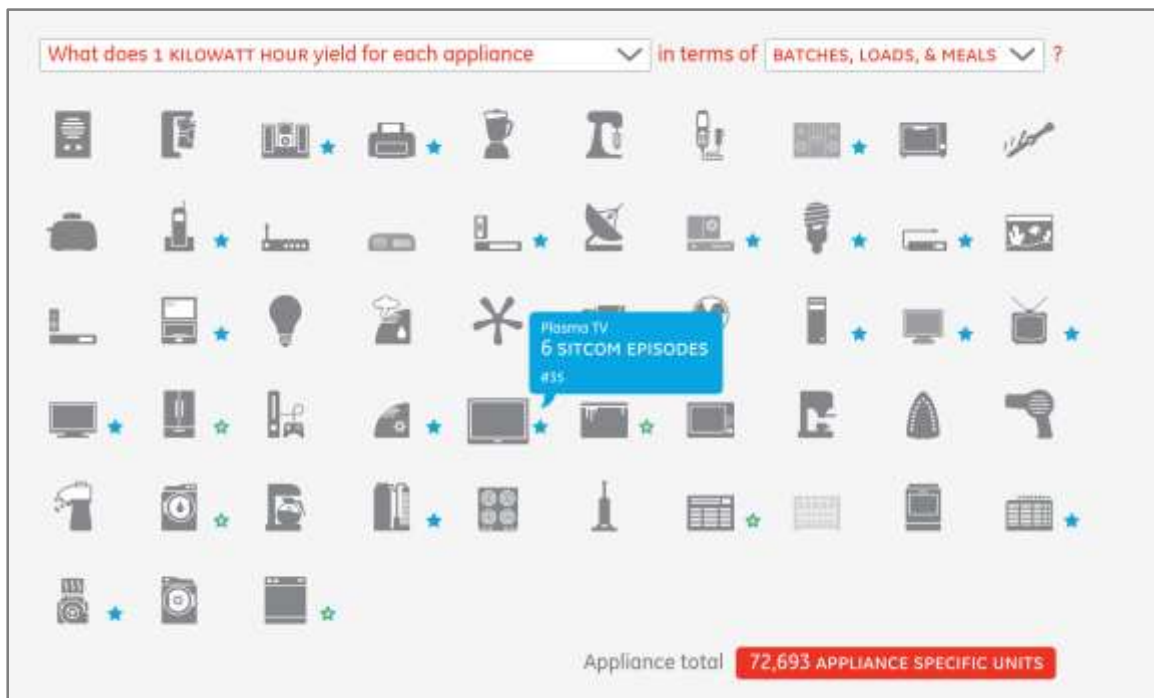
Figure 5 - Kilowatt hour

Figure 6 - Home Appliance Energy Use from visualization.geblogs.com

This information is likely more informative to the average user than the message currently given by the BC Hydro system. Another issue that emerged as part of the heuristic analysis is the inability to visualize current consumption. The system allows viewing only of data from one day in the past and backwards through time. We felt that this is another missed opportunity that should be addressed by the redesigned system.

Our recommendation is that the visualization graph should present the current energy consumption thus allowing user to easily gain a deep understanding of the connection between the way they use their electric powered devices and how they manage to get through so much energy. When they see where the energy actually goes, they can focus their attention on consumption reduction.

Analyze Your Home (Team Power Smart Activities)

The form is opened in an applet that cannot be resized even if used in a full screen mode. This could be a serious usability and accessibility issue for people with impaired vision and as such we think is an important design consideration. The form should be more consistent when it comes to phrasing questions and capitalization, but, even more importantly, how additional information or help is provided to the user. The form needs to teach the user how to use it without resorting to a help screen. The help section of many user interfaces, web-based or otherwise, end up being used by the power users only. The better and proper way to help users understand how the form works is to bring the help section to them and in a format that can easily be understood. Our recommendation is to use in-line contextual tips and question description, potentially with thumbnails (linking to detailed images) that can serve as visual cues.

The reason for this is that many questions are industry-specific and users will hardly be familiar with them. For example, showing what a water tank thermostat looks like and what is a desirable position for it to be placed is better than just asking the user this question. In addition to, this can also help the user realize that the current state is unnecessarily drawing too much energy and help her change the setting.

Another problem that emerged through heuristic analysis is that the current state of the system is not clearly given to the user. The form is lengthy and it is desirable to let the user know how far through he is at any given point. This can be accomplished by using a progress bar for each section of the form. The form should also allow the user to save the current state and exit, or switch the sections at any point without the need to navigate to the next section which is presently the case.

$75 Challenge and Member Contests (Team Power Smart Activities)

This was the only problem that was noted by all evaluators with very similar comments. Since the Team Power Smart Activities represent a leading initiative in the domain of energy consumption awareness and usage reduction through user incentives, we felt it is important for it to be addressed. Hence, it was rated with the severity of 3.

The first problem is that there is no signup button for the challenge on the Team Power Smart page. Second, prerequisite to enter the challenge is to have a full year of billing history at the current address; however, this information is not clearly stated on the contest page and is fairly difficult to find since we all experienced the same problem. It so happened that all accounts used by

evaluators were not in compliance with this prerequisite and we all struggled to find out why we are not able to enter the contest.

As it can be seen, this design flaw can lead to user error, confusion and frustration. Our recommendation is to provide a direct link on the members' toolbox homepage to sign up for the challenge. On the challenge page, for users that are not in compliance with the prerequisite, clearly state this information. Additionally, provide a progress bar that indicates how much billing history they currently have and when they are going to be eligible to enter the contest (date). Also, the system should offer the possibility to the user to receive an alert when the condition is met.

Compare Your Home (Team Power Smart Activities)

There are a number of minor design issues that should be addressed such as error prevention through limited choices and general wording. For users that do not have a full year of billing history at the present address allow either to continue using the system-generated estimate, or set an alert notification when they reach a year so that they can return and check against the real data.

A larger scale problem is how the information is actually presented to the user and how the user is supposed to interpret that data. It is the same issue as with the "Energy Consumption graph" where usage information is measured in kWh, but there is no information to help user interpret the data and make connection with the real world. Perhaps "Compare your home" feature could be integrated with the "Energy Consumption" visualization tool as they serve the same purpose.

As opposed to just having a static graph that provides energy consumption ranking in the province, there is an opportunity to engage users based on their results. For example, if I am deep in the green zone, the system should generate contextual links to offer me to enroll in $75 challenge (system integration), or perhaps even better, award me with a certain discount for energy savings and offer to set the goal for the next year and potentially earn additional savings (incentives).

Conversely, if I am in the red zone, provide contextual links to learn about energy consumption and what contributes to those factors. Show me my current consumption to make me realize what actions can be made to start saving energy. Finally, offer to enroll in $75 challenge, plus additional incentives if certain goal is met (entering the green zone on the scale).

Compare Your Home (Team Power Smart Activities)

All our recommendations for redesign are formed around the idea that the site should be focused more on real-time interaction and provide real-time information. To achieve this, alerts can play an important role. Alerts are especially important for power and more advanced users and we felt that the current system does not provide a sufficient amount of flexibility for a task to be achieved more effectively.

Recommended change is to provide an option for creating custom alerts. As discussed above, in the heuristic analysis findings currently only two options are offered without any customization.

With custom alerts option advanced users can create their own alert behaviour that can help them interact with the system in a more efficient way. For example, instead of having only the option to receive alert/notification when the consumption is half way through to the step 2, it would be better that the user is notified when his daily consumption is crossing step 2 average.

Having real-time information allows the user to reflect on the current situation and react immediately by keeping her consumption within the recommended limits. We have previously also discussed incorporating alerts with the Team Power Smart Activities and the idea is that they can be enabled on any given page, but also centrally managed from the Subscription & Alerts page.

Conclusion

Through the method of heuristic evaluation we sought to identify usability problems based on established principles. For this evaluation we followed Nielsen's 10 usability heuristics. As discussed in numerous scholarly articles and method reviews, the lists of usability problems found by heuristic evaluation will tend to be dominated by minor problems, and this was also the case with our evaluation. However, we were pleasantly surprised by the number of major violations discovered by the method, not to say that the minor problems are irrelevant.

We believe that the heuristic evaluation approach was specifically appropriate for the usability evaluation of the BC Hydro's website given that the target audience of the site is the general residential population comprised of various age groups, cultural and educational backgrounds and technological literacy and aptitudes. Therefore, no expert guidance or involvement was needed in order to complete the evaluation.

Most minor problems were discovered by all evaluators with similar comments and recommendations. Only one of the major problems was noted by all evaluators, while others were independently found. The reason for this is that evaluators also have different backgrounds and previous experience which influenced final results and findings. We see this as an advantage that enabled us to identify a larger spectrum of potential problems and further evaluate them together giving each problem a severity rating.

Overall, our impression of the method is positive, with the main advantages being the low cost of running the study, a short preparation time and the ability to identify interface problems in the early stage. The method enabled us to create a design hypothesis that we believe, if executed properly, can help BC Hydro achieve their stated goals in the short term. We recommend that the hypothesis is tested with actual users to confirm that our findings are in line with actual users' needs.