



Roles

Chris Chalmers: Usability Tester

Daphna Khen: Writer

Leah Kim: UX Designer

Garrett Lee: Manager

Overview of Problem and Solution

Many consumers are not against reducing their home energy usage, since it both helps the environment and saves them money at the same time; however, the main obstacle they face is apathy. Other than monthly utility bills, there isn't an easy way for homeowners to monitor their energy usage and see where or how they could save money, and as a result, most people only have a broad sense of what their home energy usage is like.

We at JuiceBox intend to develop an application that monitors, tracks, and displays a user's home energy usage, so that users can not only see more specifically how they currently use energy, but also see how they can reduce their energy bills through purchasing more energy efficient appliances and by changing specific lifestyle behaviors. By providing users with more information about their home energy usage, we hope to both help users reduce their energy bills as well as help our society as a whole collectively reduce our environmental footprint.

Contextual Inquiry Participants

Steve, our first participant, is in his 50's and lives with his family of four in Bellevue. Over the past 4 years, he has slowly been trying to optimize his home energy usage through replacing old appliances and light bulbs with more energy efficient ones. He keeps a record of his water, electric, and gas bills, but most of the time he just files them away in the file cabinet and never looks at them again. He has installed a couple programmable light switches for the porch light that go on before sunset and turn off late at night. Steve is a good example of a cost-conscious, tech-savvy consumer who is interested in adopting new energy efficient technology if the price is right and it makes things more convenient. We met him at his house, where he showed us his energy bills, how he got the information he wanted out of them, and he described his thought process behind purchasing energy efficient appliances and making specific lifestyle changes to lower his family's energy bill.

Daniel, our next participant, is a twenty-year-old UW undergraduate student living alone in an apartment studio. He pays the rent and utility bills with his parents' support and his part-time job. His apartment takes care of all utility bills other than electricity bills, and he receives and pays his bill online.

He checks on his electricity bill records, before paying the two-month electric bills, just to make sure there is sudden incline. He has not made a significant energy-saving effort, and does not plan to do so because he is satisfied with his average electric bill amount. Daniel represents a cost-driven customer who lacks knowledge in and passion for energy-saving. We met Daniel at a coffee shop and conducted contextual inquiry, observing his process of telling us about his energy usage habits. We specifically asked him to convey his energy usage from the previous day, his thought process for taking action in utility bills management, and his opinion about our potential product.

Eve and Mike, our next participants, are a home-owning couple in Bellevue, both in their 40s. Their oven caught fire so we found them at Home Depot browsing for a new one in the appliance section. They were actively working with one of the store employees to make a decision. We talked to them in the middle of their decision-making process and started with simple, non-leading questions like “what factors are you considering as you make this choice?” These questions gave them a lot of freedom and put them in control of the conversation, fostering the desired master-apprentice relationship. We always reacted to their responses with interest and positivity to keep them comfortable in that role.

We also spoke to Mike, Steve, and Eric, all Home Depot employees. They were in the lighting aisles of two different Home Depot stores, one in Bellevue, the other in Shoreline. Each of them had experience helping countless customers make lighting purchase decisions. We opted not to immediately explain why we were talking to the employees, letting them to at first assume we were customers instead; this employee-customer relationship put us in an apprentice position. Throughout the inquiries we conveyed genuine, friendly interest in their responses to keep the discussion conversational and avoid an interview atmosphere.

Contextual Inquiry Results

Several themes came up in all inquiries we conducted. The most pervasive one was that people seem to care about their energy usage mainly due to financial concerns, not necessarily environmental ones. Every participant that we talked framed their actions (or in Daniel’s case, inaction) with respect to decreasing usage in the context of reducing their bills, not being eco-friendly. This information will be incredibly useful when we decide how to present information to users.

Another theme shared by all whom we spoke to is that their energy usage is something they rarely think about, and do not see themselves becoming very involved. Whether this is because they don’t see a problem (like Daniel) or because it is simply not something they would like to incorporate into their routine (like Steve). Energy usage – both its environmental and monetary aspects – takes a backseat to convenience.

It also became apparent that no matter how much or how little people cared about their usage, they simply do not currently have access to good, detailed data about their usage. Steve files some of his statements, but this only lets him see total usage on a monthly scale. Daniel’s information is even more coarse, with information only every two months. No one had any way to really tell what appliances were costing them the most, which led to making decisions based on guesses. Eve and Mike expressly told us that energy-efficiency was not a concern in their search for a new oven because they don’t believe that their oven would make up a significant portion of their bill, but they were basing their decision on intuition (or maybe even just a hunch) rather actual facts.

The different participants also revealed unique information. Our conversation with the Home Depot employees revealed that many people make energy-related purchase decisions, like incandescent light bulbs vs. CFLs, based on habit rather than any logical reason. We also learned from them that people tend to have difficulty with considering the long-term savings aspect of a purchase – for example, the fact that CFLs are still more expensive than incandescent bulbs up front, but their longer life and lower usage often makes them the cost-effective option. The caveat here, of course, is that the people who are most likely to ask an employee for help are those who are not experts, skewing these impressions somewhat.

From Eve and Mike we learned that it is somewhat naïve to consider “utilities” as one area to explore. In their case, they were satisfied overall with their electricity and gas usage, but felt they had room for improvement when it comes to water, showing that these different facts do not always go hand-in-hand. Another insight we gained was that having detailed data can be truly empowering—Eve and Mike literally found a sprinkler leak through examining their water bill, proving that data can expose costly problems to average consumers.

Steve showed us the kind of steps that consumers take to minimize their spending even though they don't necessarily have good data on what will be or has been effective. He described changes in the past few years such as buying more CFLs and switching to energy-efficient kitchen appliances, and stated that he's pretty sure that all those changes together made a difference, although he couldn't quantify it. He noted that he feels that he's done everything he reasonably can, and that even if there are any other changes he could make then he is not sure how much more of a financial difference it would make. He has a programmable thermostat that keeps the house at a cool 66 degrees during the day and an even colder 58 degrees at night to reduce energy costs, so he has made lifestyle changes to reduce usage, but does not know or care enough about further opportunities for reductions to research it himself. It would be helpful for someone like Steve to be able to quantify the effect of the steps he's taken and suggest ones he hasn't considered, as it would make it easier for him to reach his goal of reducing usage.

Daniel had very different needs from Steve or Mike and Eve, highlighting the variety of people's involvement with energy usage. As someone who only pays for one utility, his statements seem low even if they represent higher-than-average usage, and thus taking meaningful steps to be more energy-efficient is simply not a big priority for him. The fact that his bill represents one student's usage rather than a family's also makes the total cost he is responsible for a small number, even though he might in reality be paying more than other people in his situation. People with differing housing and family situations clearly have very different concerns, and this needs to be taken into account.

New and Existing Tasks

Easy Task – comparing energy usage

Catalina is a junior undergrad at the University of Washington's College of the Environment, and lately she's been really interested in ways to reduce her carbon footprint. She lives by herself in a Wallingford apartment, and wants to figure out what most of her electricity usage goes towards, empowering her to take steps towards becoming meaningfully greener.

Her friend Pierre told her that Puget Sound Energy's electricity bills contain usage graphs by month, which he has used to estimate how much energy is used by his space heater and lights (both used more

often in the winter). Her girlfriend Sonia has a small energy usage monitor that she offered to let Catalina borrow for a few weeks, during which she could leave it plugged in to various appliances and compare them by hand.

With JuiceBox, Catalina will be able to easily see the difference between her devices' energy usage. Her data will be constantly collected, and usage reports will clearly show where the most juice is flowing

Moderate task – being alerted about abnormal usage

Sunil is a single father to twins Kumar and Sruthi, aged 11, and works as a biology teacher at a local middle school. The family lives in a spacious split-level house that is an hour's drive from Sunil's job. The twins are both rambunctious and forgetful, and Sunil is often worried that they will play with some appliance and cause damage. This worry is not unfounded, as he remembers getting a water bill once that was at least twice what he usually pays, and after searching high and low discovered that his children had played with the hose in the backyard near the start of the 2-month billing period, but had forgotten to shut it off. The water, aside from being quite expensive, also caused some structural damage to his house, and Sunil is not eager to repeat the experience or have another one like it.

For now, all he can think of doing is try to keep a better eye on his kids while he is at home, check all crannies of the house more frequently, and ask his neighbor Saba to check in on them after they get home but before he does.

With JuiceBox, Sunil will be able to opt-in to receive alerts every time his usage seems to be trending towards a much higher usage than is normal for his household, so the next open window letting out heat or ill-shut basement refrigerator eating up electricity will be caught much earlier.

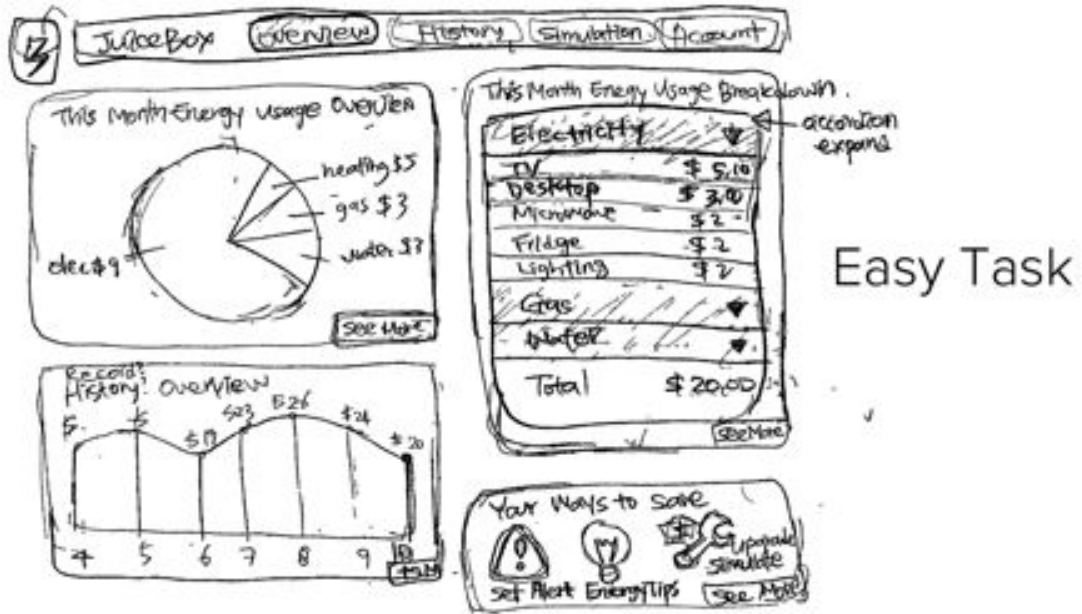
Hard task – calculating projected savings

Aisha is 43 years old and lives by herself in a small villa in Bel Air. In the past year, she has received many flyers from the LA Department of Water and Power encouraging her to switch to energy-efficient light bulbs such as CFLs and LEDs. She wants to switch to the cheaper of the two options, since her house has so many light sources. Aisha knows that while LEDs cost more, they also last longer and use less power than CFLs, so she isn't quite sure which choice is the better one, fiscally speaking.

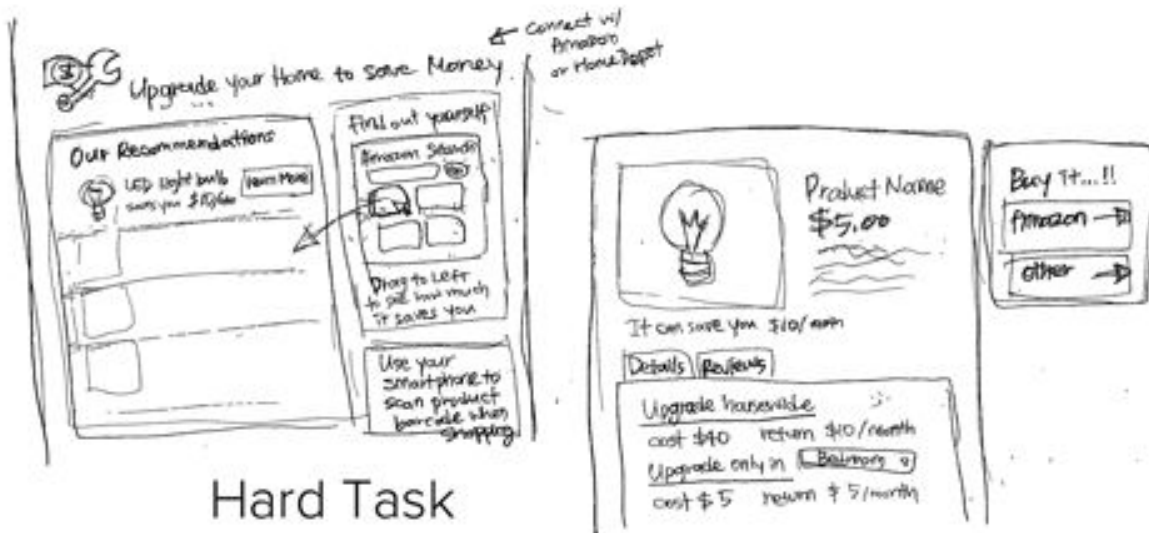
At her local hardware store, all of the bulbs are labeled with their expected lifetime and estimated energy costs per year, but Aisha isn't sure if these figures are reliable. Her large house meant that some bulbs would see far less usage than others, so the energy-saving costs (which do not take local utility prices into account anyway) were not helpful. She asked a few employees for help, but they were not able to give her better estimates without knowing any details of her living situation.

With JuiceBox, Aisha would be able to compare CFL and LED bulbs for all of the fixtures she wanted new bulbs for, and the energy savings cost would be based on her normal behavior rather than mysterious "averages".

Designs



Easy Task

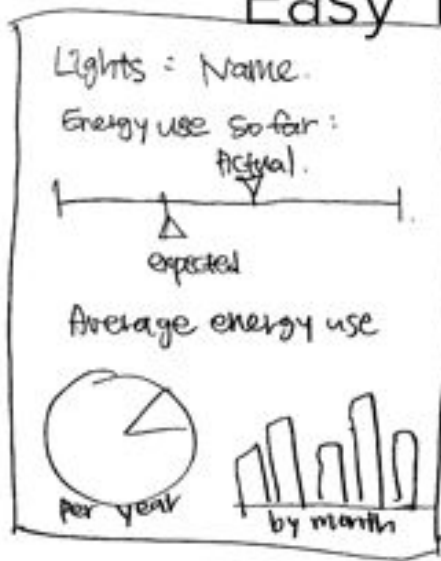


Hard Task

Easy Task

My Appliances.

Brand name	33%	\$7	edit X
Brand name	2%	\$2	edit X
name	3%	\$3	edit X



Shopping: lights
scan product barcode

// phone
camera

search

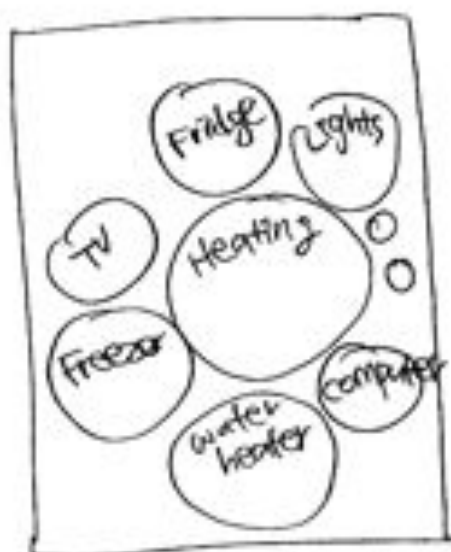


Scan Another Item.

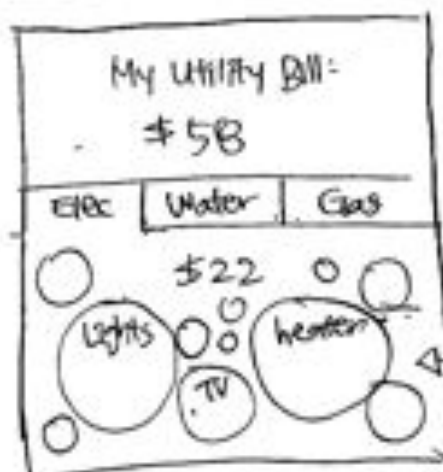
current	after
Lights	Lights
etc	etc
water heater	water heater
heat	heat

Hard Task

scan + measure savings

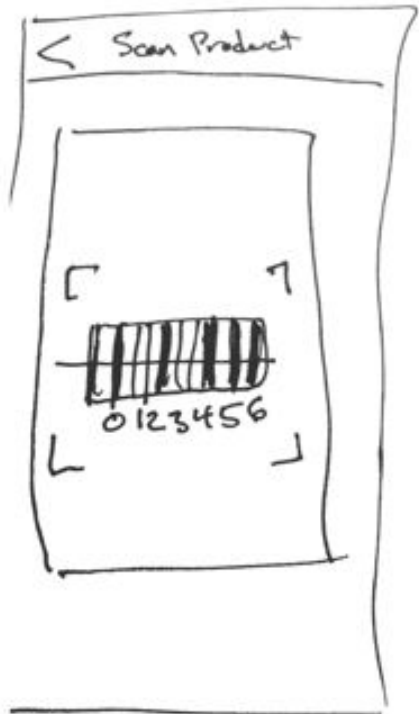


Easy Task



select an appliance for details.





Hard Task

Moderate Task

⬅️ setting

Edit Account

Edit Appliances

Alerts

FAQs

⬅️ Alerts

Text Email

Total bill

Overusage

over \$

over %

appliance usage

over \$

over %

← config in "Edit Account."

or

⬅️ Alerts

Recipients

(+)

Total Energy Overusage by %

Abnormal appliance usage by %

or

⬅️ Alerts

Text Email

Total Bill Overage

over \$

50 ————— 250

Over %

0% ————— 100%

Appliance Usage

over \$

5 ————— 100

over %

6% ————— 140%

+ add new appliance