KILOWATT

Kill the Watt.

niho5658
ting0658
tlim4692

Introduction

The gradual increase in electricity bills and energy usage by homeowners over the decade has resulted in spending constraints to meet financial commitments. A solution that homeowners have resorted to was switching to renewable energy such as solar energy. The solution shifts the focus from the reliance on grid energy to self-generated energy as it would reduce the cost of electricity bills. Although there has been a rise in the installation of solar panels in homes, the return on investment of solar energy is still a high price to pay for some homeowners.

Context

What is the problem context?

The way in which Australia generates, uses and perceives electricity has changed, is changing and will continue to change over time. As different forms of energy were discovered and the technology to extract, generate and distribute were developed, the way we lived and worked also changed. These two factors combined with an expanding population and economic demand has resulted in our energy consumption growing exponentially. As a result, fears over the depletion of our natural resources and the effect of carbon emissions have on the environment led to an exploration into renewable energy and the role natural gas could play as a low carbon fossil fuel.

With the advent of industrialisation, manufacturing and advances in transportation and technology, Australia's energy landscape began to shift. The uses of for electricity increased and began to become more readily available and from the post war years onwards, a steadily wealthier population began to buy more appliances and consumption grew. In the boom years of the 80s and 90s, we bought a host of new appliances fuelled by technological advances.

For the first time in decades, our energy consumption is showing smaller annual increases. This is due to a united drive to be more energy efficient across households and businesses. Electricity generated by renewables is also rising, although its contribution to the overall energy supplied within Australia remain relatively low. Natural gas and electricity still remain as the two main energy sources consumed in Australian homes and businesses.

Foreseeable, the Australian industry is by far the largest consumer of energy but even industries such as manufacturing, mining and transport is showing concerted efforts to be more energy efficient. As a part of the global desire to minimise carbon emissions, Australia is increasingly turning to renewable energy and natural gases.

How significant is the problem?

The inevitable growth in the cost of electricity bills has caused issues for homeowners as it has enforced the notion of restricting the use of household technologies or appliances to reduce energy usage. The increase in electricity bills brings forth further issues for homeowners as adjustments to financial commitments have to be made in order for them to be stressed free.

Who does it involve?

With the aid of the stakeholder mapping method, we explored and identified key stakeholders in relation to the electricity industry. Core stakeholders are the stakeholders who have the biggest impact on the electricity industry and include the households/consumers and electricity generators. Direct stakeholders are the stakeholders that have a direct influence on the electricity industry and include electricity providers, the Australian Energy Council, the Australian Competition and Consumer Commission (ACCC), Australian Energy Market Operators and Commission, State Service Commissioners and Consumer Energy Ethics Services. Finally, we identified the indirect stakeholders are stakeholders who have a minor influence on the context. This included industries such as nuclear energy, renewable energy, mining & automotive, solar panel installers, the government and NSW Environmental Protection Authority (EPA).

Solution

What is the solution?

The solution is, *Kilowatt*, a household energy phone application that tracks energy usage whilst providing rewards and incentives when users hit milestones or targets. Kilowatt utilises a ranking system to encourage the user to consistently reduce energy usage to create incentives. Each rank presents users with new rewards such as discounts to solar panels and retail stores. Kilowatt also delivers a map of households and their owners who have signed up to the Kilowatt app to portray a competitive atmosphere between users. The app does not explicitly create a competition with users but displays user's energy usage to suggest competitiveness.

Research Overview

What research did you do?

How energy companies are innovating
Origin Energy has intentions to make clean energy for the future. They have utilised networking innovations with other companies (Bidgely and EnergyLab) to work towards this goal. Origin has networked with Australian start ups to find innovative customer solutions for the management of energy.

Tesla has innovated through product performance, product system, network and brand. Tesla's Powerwall is an example of product performance where it works in conjunction with solar panels and energy providers (e.g. Origin) to allow homeowners to switch to a renewable energy source for their homes. Tesla has also introduced a mobile phone app that aids homeowners in managing their energy usage. Tesla's establishment as a company from their well-known product, Model S, is evident of their brand innovation for customers to trust them as one of the leading companies in renewable energy.

WePower has created a product system and network where their services aim to make power tradable and accessible to anyone. The system created by WePower allows customers to control their energy through contracts and also auction green energy (amount of energy volume) through their own WPR tokens. WePower networks with other businesses to assist them to trade power through contracts.

Enova's innovation stems from their business model where they created a community that allows them to generate, store and share their own energy with one another. They are a social enterprise that is a registered charity. They recycle their profits into community renewable energy projects. Customer engagement is another innovative method undertaken by Enova who advocate for energy education.

Key User Insights

What did you uncover through your research?

Following the Venn Diagramming exercise we can draw the following insights about the relevant identities in relation to each other:

Stakeholders	
Energy providers	Current energy providing companies are expanding their product diversity by offering alternative renewable energy sources, like solar panels and solar batteries in response to the increase in the household desire to become less reliant on the main power grid
Energy installers	Offering services in both traditional fossil fuel and renewable energy technologies. They are often contractors or employees at energy providing companies, who are beginning to also offer a wider variety of services in the space of renewable energy technologies. Some of these services include the installation of solar panels and solar batteries.
Energy distributors	Work in collaboration with local councils and governing bodies to regulate and provide energy to households. Energy distributors work directly within the guidelines and regulations set by local councils and governing bodies, in order to provide energy of all sources to a wide range of households.
Governing bodies	Investing in renewable energy such as rebates to renewable energy users. In addition to consumer households looking to switch to renewable energy utilities, the government is also creating further incentives for even more households to switch. Part of these initiatives by state governing bodies are solar panel rebates that can assist households in their switch by reducing the net cost of solar panel installation by 30-50%
Households	Becoming increasingly aware of alternative energy options, in addition to more diverse energy offerings. Increased options means more diverse products and services, which allow households to tailor their energy needs in better ways. Central to all entities, households are the consumers that are now presented with more options than ever before. The increased diversity of energy utility products creates more opportunities for households to find a more personal and tailored solution, services for which can be purchased from even more providers than ever before.

Additionally, sorting through the different research trends provides even greater insights into the key characteristics that are driving the current shift in the utilities industry. Through the insight sorting exercise, there are several lines of research materials that provide further depth into the hierarchies involved.

There are several key insight clusters that provide greater depth with key characteristics:

1. Sustainable Future

The use of renewable energy paves the path towards cheaper, cleaner and a more sustainable future. Key characteristics include:

- **Government:** The major financial drive into the sustainable future is supported by the Australian Government, who are heavily investing in meeting renewable energy targets

- **Cheaper:** The use of renewable energy sources, like solar, wind and hydro have far lower running and maintenance costs in comparison to traditional fossil fuel burning.

- **Cleaner:** A major reason for the switch towards renewable energy for a more sustainable future since solutions like solar and wind energy produce little to no greenhouse gases or toxic waste in their energy production processes.

- **Sustainable:** is defined as 'one which is able to meet the growing demand of today's people without compromising the demand of the people that would require it in future'. Renewable energies are naturally replenished, hence are major steps towards a more sustainable future.

2. Switching to Solar

For many households, the desire to switch to solar energy exists, but there are several factors that need to be considered by homeowners before making the switch. Key characteristics include:

- **Costs:** Household solar can cost from as low as $4500 for a 3kW system size, and scales in price upwards with increasing household energy requirements. While solar panel costs are decreasing, there are many other costs involved like installation, inverters and even solar batteries.

- **Difficulty:** Independent solar quoting companies exist for a reason: installing solar panels in a difficult task. The installation process introduces new infrastructure that requires external assistance, in addition to introducing further costs

- **Benefits:** With several tiers of solar energy independence, the benefits for the household vary greatly. Several factors like roof size, whether people are at home during the day, shaded roofs or even council restrictions can greatly decrease the benefits of switching.

- **Consideration:** Similarly to weighing the benefits, all these factors above have to be considered by a household before making the switch to solar energy.

3. Self-sufficiency

The increasing availability of solar power, in addition to the increasing cost of traditional mains power provided by the grid has led to more consumers looking to become more independent. The use of solar panels and solar batteries, in addition to community microgrids enables households to become entirely independent by producing their own energy. Key characteristics include:

- **Self-generated:** Decentralisation from the main power grid through household solar power sources creates a new type of homeowner that now self-generates their own electricity. This is the primary step towards becoming more self-sufficient.

- **Technology:** Self-sufficient power extends even beyond energy utilities, with technological advances into electric vehicles which will change the way that households consider self-sufficiency even beyond disconnecting from the grid.

- **Long-term:** Self-sufficient power is a long-term investment; investing in solar panels and solar batteries in an expensive venture, but one that all households look towards paying for themselves in the long term beyond 5 years.

- **Saving:** The major benefit for most households when they switch to solar energy sources. The potential savings that can be made by becoming self-sufficient can be down to $0 or even go beyond with the potential of sending power back to the traditional grid for credits.

- **Reliability:** While solar panels can degrade over time, reducing their efficiency, but newer technologies and efficiencies in higher quality solar panels provide even greater value through far better reliability, with many lasting for decades at optimal levels of efficiency.

4. Technology Infrastructure

One of the major benefits that comes with switching to renewable energy is the new infrastructure that is installed with it. Key characteristics of newer technology infrastructure in the utilities space include:

- Assistive: Assistive technology in the utilities space are aimed primarily at assisting households to have a better understanding of their energy usage. Prior to this, the primary interaction that households have with their energy providers came in the mail every month as a bill.

- Tracking: The ability to track the household energy usage is a major tool towards a better understanding of irregular spikes in usage. Part of this characteristic includes the interpretation of the data that is generated by a household's electricity usage.

- Monitoring: In conjunction with energy tracking tools, the ability to monitor household energy usage by enabling a closer watch on certain usage patterns will assist in making the average homeowner an energy 'prosumer'.

- Managing: Bringing together assistive, tracking and monitoring energy tools to the household consumer creates an opportunity for the homeowner to become the manager of their own energy utilities.

The use of the Design Principle method, allows us to transition from the insights that we have framed to begin to explore concepts in a disciplined manner so that concepts that we developed are fully grounded in objective research data rather than subjective assumptions. Key design principles are explored and outlined:

Investing in renewable energy will help to build a more sustainable future, and provide cleaner alternatives to current finite resources.
With the awareness of the impact of fossil fuels on the environment, governing bodies have increased their investments in renewable energy, aiming to build a sustainable future.

Looking for other electricity sources will help households reduce their energy costs, especially because energy costs are currently increasing.
For all households, the cost of energy from the traditional grid is increasing, resulting in many looking for other options.

Switching to renewable energy would reduce the costs of energy usage as it would provide a method to become independent or self-sufficient.
Households are beginning to strongly consider switching to renewable energy options to reduce their increasing energy costs, or even become self sufficient.

Investing in renewable energy will not be worth the investment due to cost and awareness.
For many homeowners, the costs of switching to renewable energy outweighs the long term benefits, resulting in many households waiting for cheaper options.

Increased transparency and visibility of live energy usage will assist households in better management of their electricity usage and costs
Energy utilities have technologically advanced to assist households with greater visibility and awareness awareness over their current energy usage, in addition to being able to have finer control and measures in place to better manage their electricity and costs. However, for many still using traditional energy utilities, these management tools are not available within their ageing infrastructure.

Design Criteria

Design Brief	Specifications
Design Considerations	• Provide full visibility over a household's energy usage • Provide the user with live energy usage data • Contain the management tools and insights that are required • Provide a platform for energy users to generate another stream of revenue to assist in reducing personal energy costs • Educate users on energy • Create a community based off energy usage • Provide a gamified competitive environment to create further incentives to reduce energy usage

Value

How does your solution address the identified problem/issue and add value to the user and the chosen industry?

The issue is addressed by Kilowatt through a live energy tracker whilst providing community goals for the user to hit by energy saving. Achieving goals and milestones allows users to redeem their points for awards. The solution offers insights for local councils to see area peak energy usage whilst allowing users to collaborate with one another as a community to achieve targets. The cost of energy bills has been drastically increasing over the past few years and Kilowatt aims to reduce these bills through incentives to encourage users to reduce their household and community energy usage. The app also provides a platform for local councils to gain insights on the areas with peak energy usage and low energy usage.

Design Process

Week 8: Explore Concepts

We structured brainstorming to identify opportunities and explore new concepts. As a starting point, we used the insights, opportunity statements and design principles previously framed to generate new concepts.

Design Brief

Before we started brainstorming concepts, we first wanted to get an idea of the design situation and specifications to help guide ideation and solution development. By using the Design Brief method (fig. 1) we were able to identify the design brief that the solutions had to adhere to while considering the features that it will need in order to directly achieve the outcomes. Furthermore, it also made us consider the design constraints that the solution will be working within and around such as user behaviour and social trends.

Some of the design considerations identified using the Design Brief methods was that the solution needed to provide full visibility over a household's energy usage and provide them with live energy usage data. The solution is also required to contain management tools and insights to better manage household energy usage and costs. Design constraints identified and explored include acknowledgement of privacy and constraints with users being able to control how much of their data is being shared and possible competitiveness of a gamified environment could provoke cheating.

Design Brief

Outlines the design situation and specifications to guide ideation and solution development.

STEP 1: Opportunity Statement

Without describing the solution define what the design intent is, what outcomes do you want to achieve?

Consumer households still connected to the grid are becoming increasingly interested in having greater control and management over their energy utilities, and hence are highly interested in finer, more accurate, minute-by-minute live tracking and monitoring energy usage tools.

Self-generated households are increasing in number each year and more homes are providing energy back to the local grid or energy distributor at a fixed rate. However, households seek opportunities to achieve another or a better stream of revenue.

STEP 2: Design Principles

From the Design Principles Generation task write down the principles that the concept should include.

Increased transparency and visibility of live energy usage will assist households in better management of their electricity usage and costs

Looking for other electricity sources will help households reduce their energy costs, especially because energy costs are currently increasing

Switching to renewable energy would reduce the costs of energy usage as it would provide a method to become independent or self-sufficient

Investing in renewable energy will help to build a more sustainable future, and provide cleaner alternatives to current finite resources

STEP 3: Design Considerations

What features must the solution have?

This solution needs to provide full visibility over a household's energy usage.
This solution also needs to provide the user with live energy usage data.
This solution needs to contain the management tools and insights that are required to better manage the household energy usage

The solution needs to provide a platform for energy users to generate another stream of revenue to assist in reducing their personal energy costs.

This solution needs to educate users on selling their energy back to grids

This solution needs to create a community for users to trade energy with one another at different rates

The solution needs to provide a gamified competitive environment to create further incentives for people to reduce their energy usage and costs

STEP 4: Design Constraints

What are the potential constraints? What aspects cannot or should not be changed? User behaviours? Social trends? Laws? Business/product standards?

Some of these solutions may require additional IoT products in order to provide live tracking energy usage data

Consumer to consumer trading energy services would require legal constraints

Accountability would be a constraint for energy trading as it could cause issues with responsibility

Users need to acknowledge that their data is being shared with other users
Competitiveness of gamified environment could create grounds for cheating

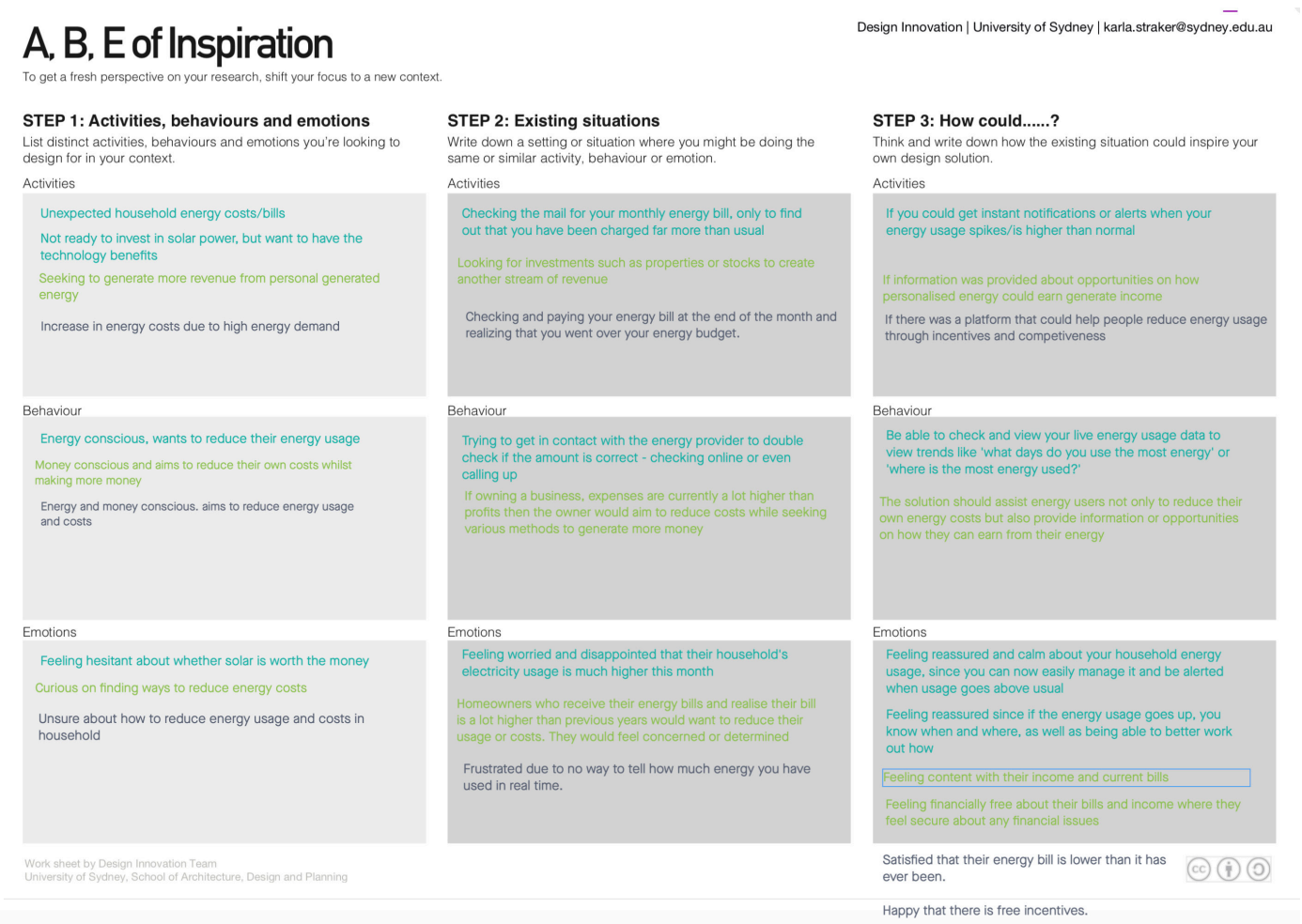
Live tracked data needs to have privacy constraints, with users being able to control how much of their data is shared.

Wholesale energy data requires privacy constraints as large amounts of data is being shared such as address and payment details

Figure 1: Design Brief

A,B,E of Inspiration

After we outlined the design situation and specifications, we used the A,B,E of Inspiration and Brainwriting method to help ideate and develop our concepts. A,B,E of Inspiration (fig. 2) allowed us to gain a new perspective on the motivations and underlying behaviour associated with the current context and how our new proposed context going to change the current.



A, B, E of Inspiration

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To get a fresh perspective on your research, shift your focus to a new context.

STEP 1: Activities, behaviours and emotions

List distinct activities, behaviours and emotions you're looking to design for in your context.

Activities

Unexpected household energy costs/bills

Not ready to invest in solar power, but want to have the technology benefits

Seeking to generate more revenue from personal generated energy

Increase in energy costs due to high energy demand

Behaviour

Energy conscious, wants to reduce their energy usage

Money conscious and aims to reduce their own costs whilst making more money

Energy and money conscious. aims to reduce energy usage and costs

Emotions

Feeling hesitant about whether solar is worth the money

Curious on finding ways to reduce energy costs

Unsure about how to reduce energy usage and costs in household

STEP 2: Existing situations

Write down a setting or situation where you might be doing the same or similar activity, behaviour or emotion.

Activities

Checking the mail for your monthly energy bill, only to find out that you have been charged far more than usual

Looking for investments such as properties or stocks to create another stream of revenue

Checking and paying your energy bill at the end of the month and realizing that you went over your energy budget.

Behaviour

Trying to get in contact with the energy provider to double check if the amount is correct - checking online or even calling up

If owning a business, expenses are currently a lot higher than profits then the owner would aim to reduce costs while seeking various methods to generate more money

Emotions

Feeling worried and disappointed that their household's electricity usage is much higher this month

Homeowners who receive their energy bills and realise their bill is a lot higher than previous years would want to reduce their usage or costs. They would feel concerned or determined

Frustrated due to no way to tell how much energy you have used in real time.

STEP 3: How could.....?

Think and write down how the existing situation could inspire your own design solution.

Activities

If you could get instant notifications or alerts when your energy usage spikes/is higher than normal

If information was provided about opportunities on how personalised energy could earn generate income

If there was a platform that could help people reduce energy usage through incentives and competiveness

Behaviour

Be able to check and view your live energy usage data to view trends like 'what days do you use the most energy' or 'where is the most energy used?'

The solution should assist energy users not only to reduce their own energy costs but also provide information or opportunities on how they can earn from their energy

Emotions

Feeling reassured and calm about your household energy usage, since you can now easily manage it and be alerted when usage goes above usual

Feeling reassured since if the energy usage goes up, you know when and where, as well as being able to better work out how

Feeling content with their income and current bills

Feeling financially free about their bills and income where they feel secure about any financial issues

Satisfied that their energy bill is lower than it has ever been.

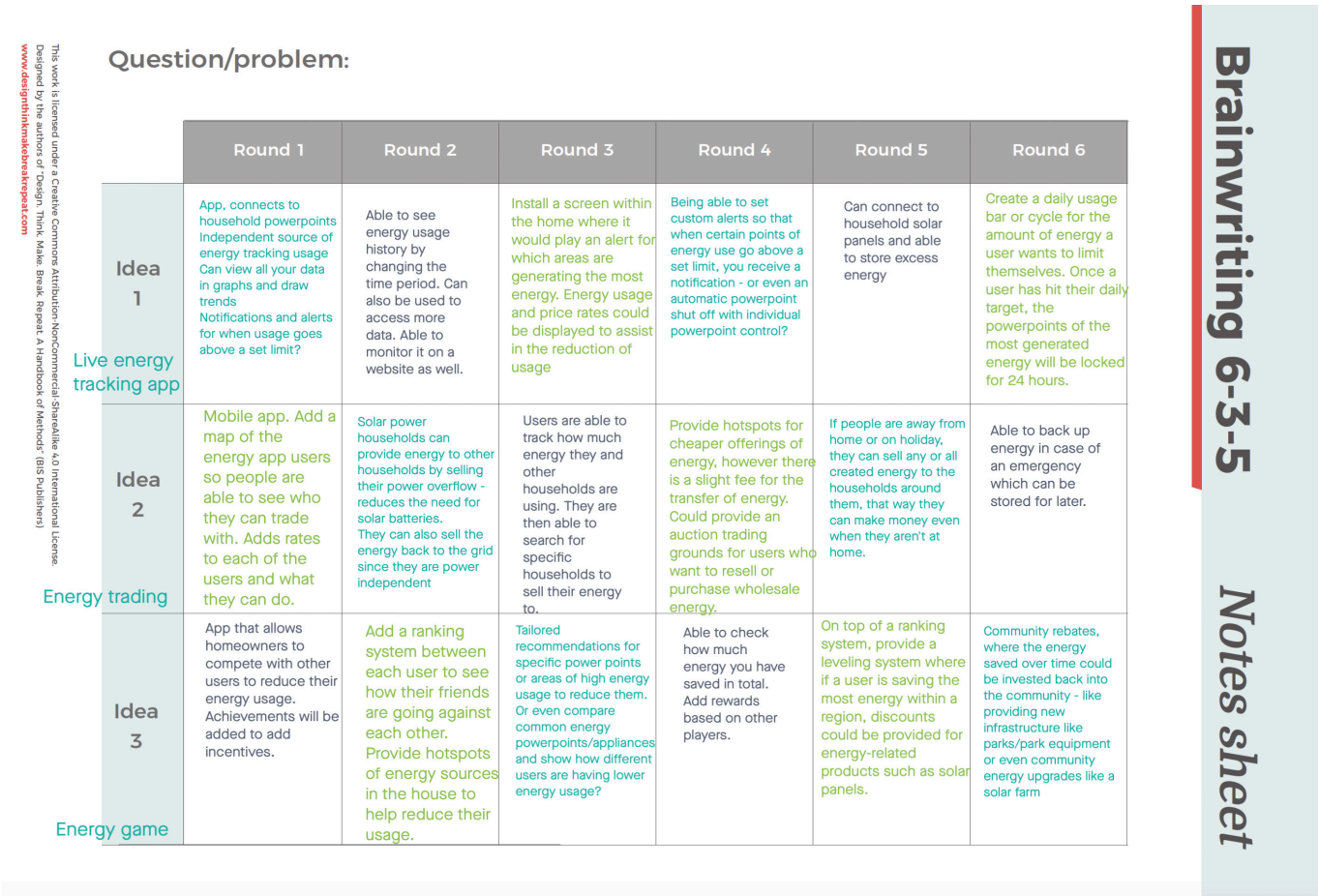
Happy that there is free incentives.

Work sheet by Design Innovation Team
University of Sydney, School of Architecture, Design and Planning

Figure 2: A,B,E, of Inspiration

Brainwriting 6-3-5

Brainwriting (fig. 3) was surprising on the most helpful tools as it ensured new and bold ideas are generated through a collaborative session. Cycling ideas through each group member provided a fresh perspective for each concept which made us consider fresh aspects that we might not have considered individually.



Brainwriting 6-3-5 Notes sheet

Question/problem:

	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6
Idea 1 Live energy tracking app	App, connects to household powerpoints Independent source of energy tracking usage Can view all your data in graphs and draw trends Notifications and alerts for when usage goes above a set limit?	Able to see energy usage history by changing the time period. Can also be used to access more data. Able to monitor it on a website as well.	Install a screen within the home where it would play an alert for which areas are generating the most energy. Energy usage and price rates could be displayed to assist in the reduction of usage	Being able to set custom alerts so that when certain points of energy use go above a set limit, you receive a notification - or even an automatic powerpoint shut off with individual powerpoint control?	Can connect to household solar panels and able to store excess energy	Create a daily usage bar or cycle for the amount of energy a user wants to limit themselves. Once a user has hit their daily target, the powerpoints of the most generated energy will be locked for 24 hours.
Idea 2 Energy trading	Mobile app. Add a map of the energy app users so people are able to see who they can trade with. Adds rates to each of the users and what they can do.	Solar power households can provide energy to other households by selling their power overflow - reduces the need for solar batteries. They can also sell the energy back to the grid since they are power independent	Users are able to track how much energy they and other households are using. They are then able to search for specific households to sell their energy to.	Provide hotspots for cheaper offerings of energy, however there is a slight fee for the transfer of energy. Could provide an auction trading grounds for users who want to resell or purchase wholesale energy.	If people are away from home or on holiday, they can sell any or all created energy to the households around them, that way they can make money even when they aren't at home.	Able to back up energy in case of an emergency which can be stored for later.
Idea 3 Energy game	App that allows homeowners to compete with other users to reduce their energy usage. Achievements will be added to add incentives.	Add a ranking system between each user to see how their friends are going against each other. Provide hotspots of energy sources in the house to help reduce their usage.	Tailored recommendations for specific power points or areas of high energy usage to reduce them. Or even compare common energy powerpoints/appliances and show how different users are having lower energy usage?	Able to check how much energy you have saved in total. Add rewards based on other players.	On top of a ranking system, provide a leveling system where if a user is saving the most energy within a region, discounts could be provided for energy-related products such as solar panels.	Community rebates, where the energy saved over time could be invested back into the community - like providing new infrastructure like parks/park equipment or even community energy upgrades like a solar farm

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www.designthinkmakebreakrepeat.com

Figure 3: Brainwriting 6-3-5

By building on each others ideas allowed us to flesh out our chosen concepts. As a result, we generated 3 unique concepts that adhered to the design situation and specifications outlined:

Live Energy Tracking (fig. 4) allows users to view and track live energy usage. It quickly finds high energy usage culprits and sets up instant alerts or even turn them off. It provides an independent source of mobile energy tracking.

Energy Trading allows users to purchase and sell their personal generated energy. It offers another stream of income for users and provides other buyers for energy besides the local grid. It encourages the use of renewable energy as it assists in generating income.

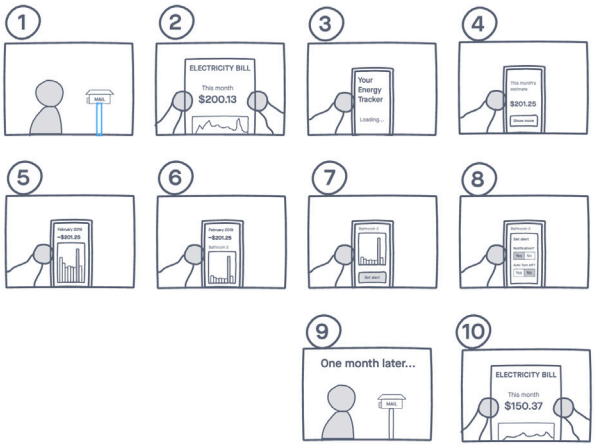

Figure 4: Live Energy Tracker Storyboard

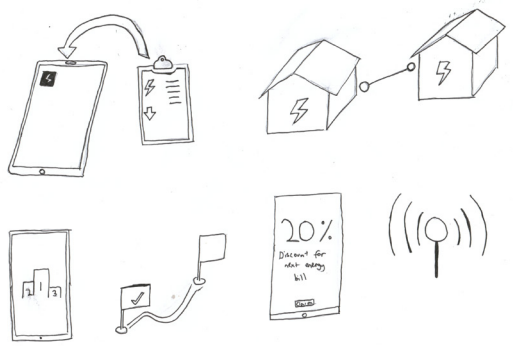

Figure 5: Utilisave Sketches

Week 9: Concept Development

Based on feedback from our concept presentation, we decided to move forward with the Utilisave concept due to it being the stronger of the three concepts because of the competitive gamification aspect and having more potential to address our outlined problem of how we can reduce energy usage and costs. As a result, we further ideated our concept of creating a competitive environment to reduce energy usage. However, we decided to put more of a focus into the value for other stakeholders such as councils and energy providers. We reconsidered how to incentivize the reduction of energy usage by providing community goals as opposed to personal goals and considered how to create more value as a community to reduce malicious intent as opposed to individual.

Solution Diagramming

Using the solution diagramming method (fig. 6) allowed us to map out and visualise the key features of the app. As a result, we had identified 4 key components we wanted to explore further. The home screen allow the user to see the households energy usage and current contribution in relation to the community goal, the insights tab which will highlight key information such as peak energy hours and total energy savings, the map tab will show the community map where you can view other households energy usage and the rewards tab where you can redeem points earned by saving energy to unlock energy utilities discounts.

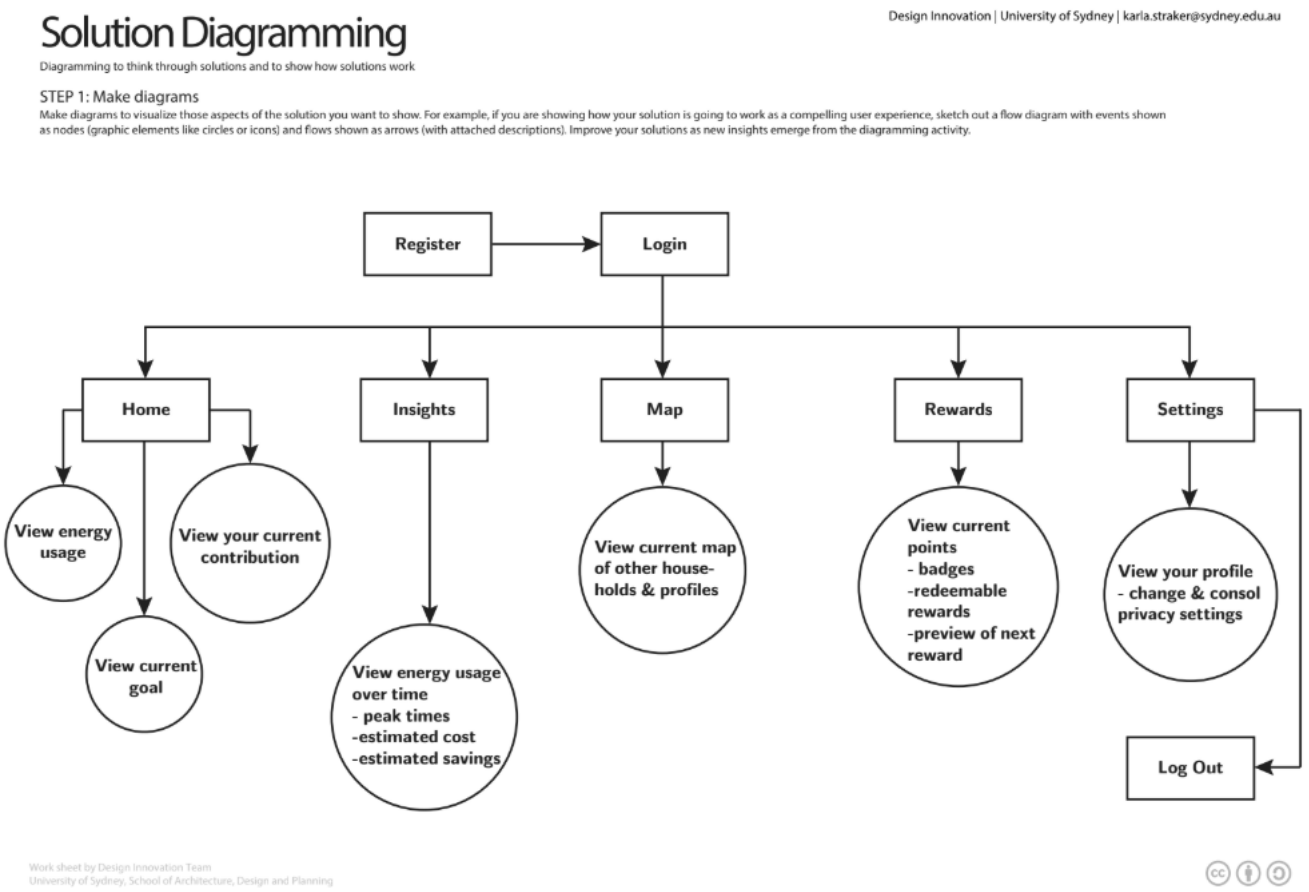

Figure 6: Solution Diagramming

Solution Diagramming

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Concept Prototype

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Embodying concepts in tangible forms to get feedback from users

STEP 1: Identify concepts to be prototyped

Review concepts to identify those that will benefit most from testing in tangible form. Determine the kinds of readily available materials you will need to create a rough embodiment of the concept. Determine what kind of prototype —appearance prototype, performance prototype, or a combination of both—will be most useful at that stage of the process.

STEP 2: Create a prototyping space and build to learn

It is a good idea to identify or create a space where your team can build and test Concept Prototypes. Assemble the kinds of materials and tools you will use for building, modifying, and testing prototypes.

STEP 3: Review prototypes, test, and discuss

Present Concept Prototypes to your team in a review session and to a group of users. Test these prototypes and discuss each one in light of the stated design principles, user needs, form factors, human factors, and other dimensions. How does it feel to hold the prototype? Is it intuitive? Comfortable? Does it make sense? Generate insights about refinements to the core concept. The review is also an opportunity to explore alternative concepts, consider combinations of features from different prototypes, and get guidance for iteration.

STEP 4: Modify prototypes and iterate

Build on existing prototypes, modify them, or create new ones to reflect input gathered through the review process. Iterate and continue to incorporate feedback into the prototype.

STEP 5: Summarize key learning

Use the conclusion of the review sessions to record the key learning and results from testing. Summarize how the prototype evolved from an initial manifestation to a final desired state. Share this information among team members and stakeholders to reinforce decisions about further development.

What concept should be prototyped?

Gamified community mobile application

What parts of the concept need to be tested?

Login/register
Home
Insights
Map
Rewards
Settings

How and who will test it?

How:
Paper prototypes/wire frames
Hi-fidelity interactive prototype

Who:
Home owners (parents and relatives)
UX/UI designers

What resources are needed for testing?

POP! for paperprototyping
Sketch to create high fidelity interface
Invision/Figma to test high fidelity interactive screens

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Figure 7: Concept Prototype

Concept Prototyping

The concept prototype (fig. 7) method allowed us to plan how we are going to create and test our concept and with who. We planned to create low fidelity paper prototypes to test with homeowner (parents and relatives) which are our core stakeholders. This will give us essential feedback and insight which we can then use to iterate and improve our concept.

Week 10: Offerings

We created a number of low fidelity wireframes (fig. 8) of the home, insights, rewards and community screens, each highlighting different elements and their visual hierarchy and user tested it with homeowners. This was an important stage in our design process as it allowed us to understand how our concept would be received by one of our core stakeholders. As a result, we gained valuable feedback on which elements users preferred for example, wanting more interactive visuals to convey insights rather than just displaying key data. Furthermore, it exposed issues that we might not have considered such as privacy issues while sharing data with other households. As a result, users are able to set their privacy constraints and control how much of their data is being shared.

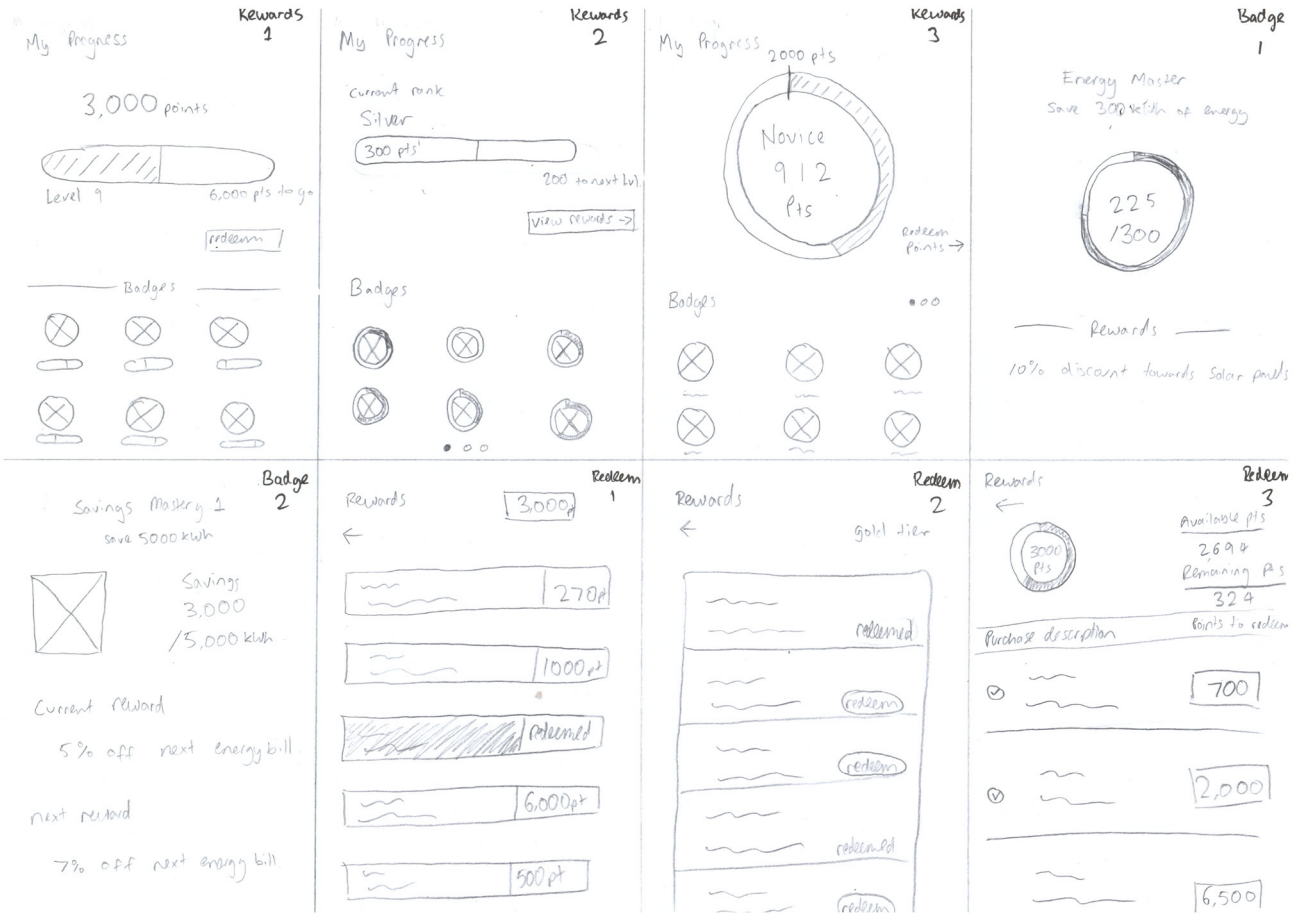


Figure 8: Low-fidelity wireframes for the layout of the progression and rewards screens to be user tested

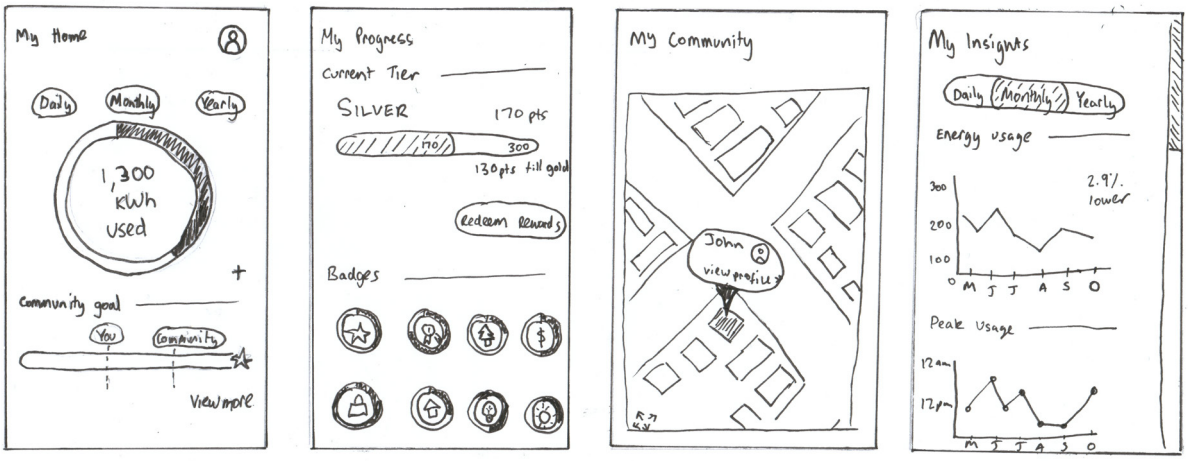
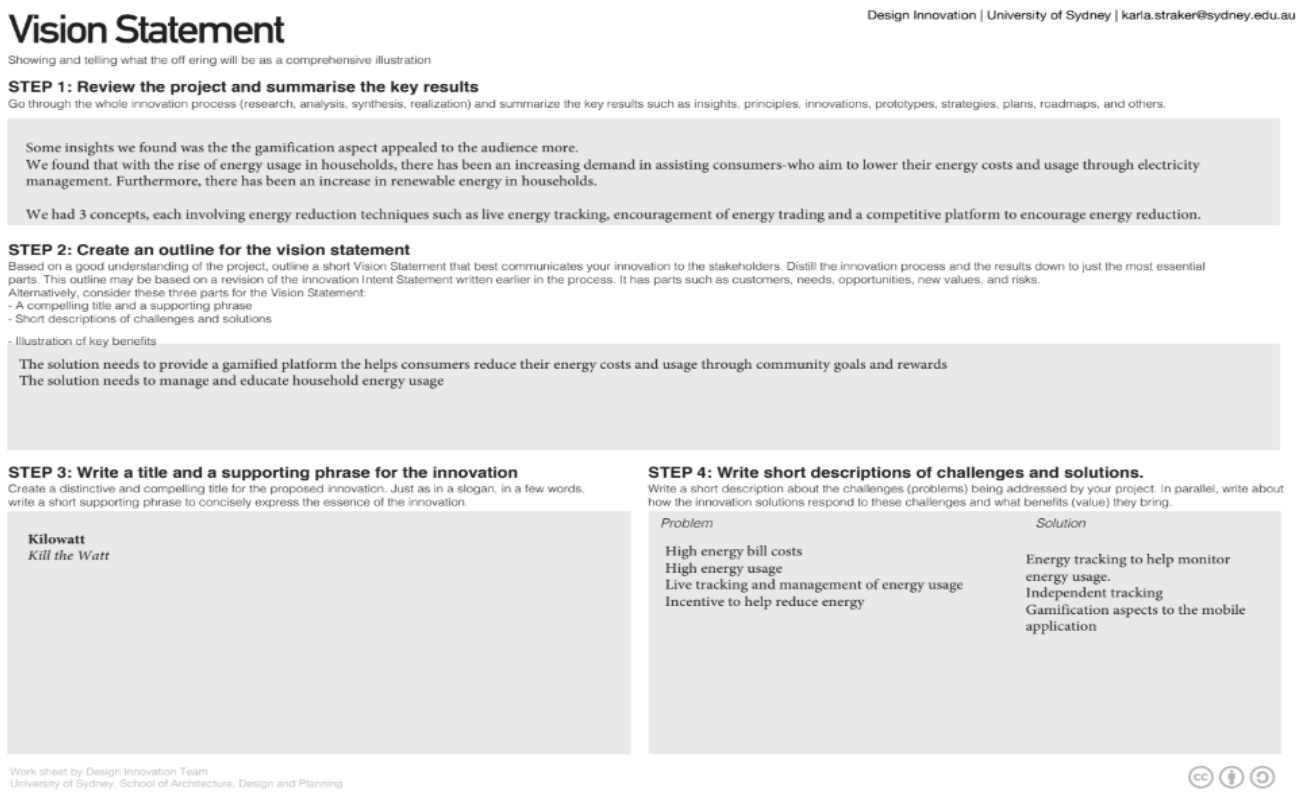


Figure 9: Wireframes of the final app structure after user testing

Week 11: Design Freeze and Communicating Solutions

Communicating design solutions is understanding how best to explain your design solution to ensure others that it can be persued.By using the vision statement tool (fig. 10), we were able to come up with our brand name and slogan as well as clearly identify how our concept addresses the challenges of reducing household energy usage. 'Kilowatt: Kill the Watt' is a simple yet effective way that encapsulates our concept as a whole and drives in the message to reduce household energy. Brainstorming our video pitch (fig. 11) allowed us to successfully conceptualise how we wanted to communicate our design solution so that it would encourage our core stakeholders to use it.



Vision Statement

Design Innovation | University of Sydney | karla.straker@sydney.edu.au

Showing and telling what the off ering will be as a comprehensive illustration

STEP 1: Review the project and summarise the key results

Go through the whole innovation process (research, analysis, synthesis, realization) and summarize the key results such as insights, principles, innovations, prototypes, strategies, plans, roadmaps, and others.

Some insights we found was the the gamification aspect appealed to the audience more.
We found that with the rise of energy usage in households, there has been an increasing demand in assisting consumers-who aim to lower their energy costs and usage through electricity management. Furthermore, there has been an increase in renewable energy in households.

We had 3 concepts, each involving energy reduction techniques such as live energy tracking, encouragement of energy trading and a competitive platform to encourage energy reduction.

STEP 2: Create an outline for the vision statement

Based on a good understanding of the project, outline a short Vision Statement that best communicates your innovation to the stakeholders. Distill the innovation process and the results down to just the most essential parts. This outline may be based on a revision of the innovation Intent Statement written earlier in the process. It has parts such as customers, needs, opportunities, new values, and risks.
Alternatively, consider these three parts for the Vision Statement:
- A compelling title and a supporting phrase
- Short descriptions of challenges and solutions
- Illustration of key benefits

The solution needs to provide a gamified platform the helps consumers reduce their energy costs and usage through community goals and rewards
The solution needs to manage and educate household energy usage

STEP 3: Write a title and a supporting phrase for the innovation

Create a distinctive and compelling title for the proposed innovation. Just as in a slogan, in a few words, write a short supporting phrase to concisely express the essence of the innovation.

Kilowatt
Kill the Watt

STEP 4: Write short descriptions of challenges and solutions.

Write a short description about the challenges (problems) being addressed by your project. In parallel, write about how the innovation solutions respond to these challenges and what benefits (value) they bring.

Problem	*Solution*
High energy bill costs High energy usage Live tracking and management of energy usage Incentive to help reduce energy	Energy tracking to help monitor energy usage. Independent tracking Gamification aspects to the mobile application

Work sheet by Design Innovation Team
University of Sydney, School of Architecture, Design and Planning

Figure 10: Vision statement

Communicating the Solution: Pitch

Design Innovation | University of Sydney | karla.straker@sydney.edu.au

Showing and telling what the solution is

STEP 1: Write your solution in one sentence *What is does and why (not your vision statement)*

A mobile phone application that provides benefits, such as discounts, based on a point system involving household energy saving to provide incentives.

STEP 2: Brainstorm how you will communicate the solution in a 2 minute pitch

- **The pitch would have the presenter ask if the audiences' electricity bill has been increasing over the past few years**
- **The pitch will then show a house with the lights on at night "This could be you"**
- **The house then has the lights turn off due to the electricity cutting out (swearing in the background)**
- **"But not if you have this'**
- **Camera pans out and the presenter is holding the phone as the video comes back**
- **Presents Kilowatt**
- **"What does Kilowatt do?" "IT KILLS THE WATT"**
- **Says this while walking**
- **"Oi you catch this" *throws phone at them***
- **Shows the Kilowatt phone app**
- **Talks about the rewards and discounts we offer**
- **How to save money through the app**
- **What does Kilowatt do again? It kills a watt *drops fake mic***

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University of Sydney, School of Architecture, Design and Planning

Figure 11: Communicating the Solution: Pitch

We used different mediums to help us convey our design solution to different stakeholders. By fabricating a physical (fig. 13) model out of timber and using the laser cutter we hoped to communicate how councils and energy providers could see insights and patterns of a local area and utilise a deeper understanding of energy usage through comparing trends. The model would allow stakeholders to compare energy usages of different households and provide better solutions to households.

Communicating the Solution

Design Innovation | University of Sydney | karla.straker@sydney.edu.au

Showing and telling what the solution is

STEP 1: Write your solution in one sentence *What is does and why (not your vision statement)*

The mobile phone application adds a gamification aspect to provide incentives for homeowners to reduce household energy usage

STEP 2: Illustrate this sentence only using images

STEP 3: Brainstorm the all the possible ways your solution could be communicated to a number of stakeholders.

Communicating to the council would be presented where a model of a suburb would be created to preview the highest and lowest usage of energy between households.

To communicate to the state government, a larger model of multiple areas (of different councils) would be created to provide an insight to the energy usage between neighbouring areas.

For the solution to be communicated to homeowners, a promotional video, previewing how the application operates, would be showcased to homeowners to see the gamification to saving home energy. They will also be allowed to see the savings they are able to achieve if they choose to reduce their home energy usage.

Posters will also be provided, possibly an instructions manual or a poster illustrating the benefits to using the application both from a homeowner and the council/energy providers point of view

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Figure 12: Communicating the Solution

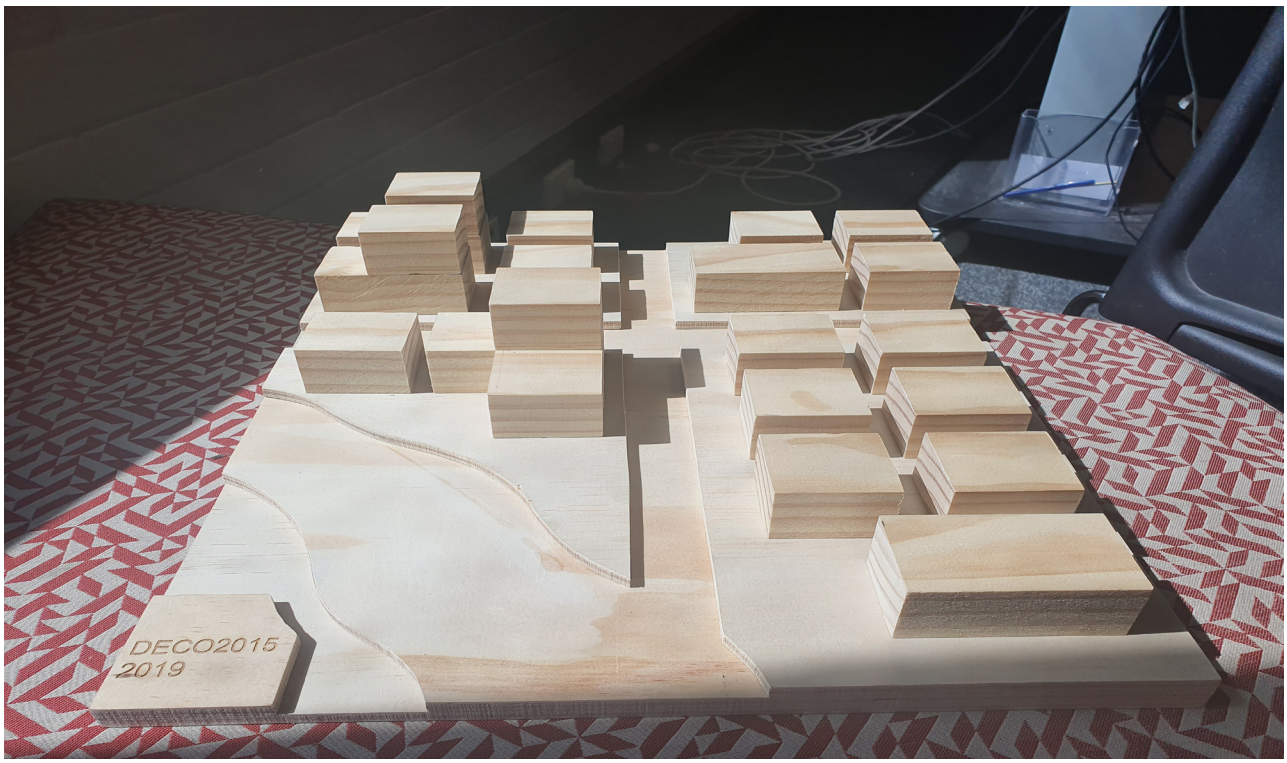

Figure 13: Physical Model for Council and Energy Providers

For the solution to be communicated to homeowners, a promotional video will be displayed addressing the problem and solution and how the app works. Alongside the video, we will have an interactive prototype of the app and most of its working features. Two Posters (fig. 14) will also be provided; one for the homeowner which will explain how they can start reducing their energy through incentives and community goals and the other for councils to see insights and trends about a geographical area.

Figure 14: Exhibit Posters

Final Solution

Kilowatt is a mobile application that encourages your community to reduce household energy usage through rewards and incentives. It provides live household energy tracking and incentives your community to meet energy saving goals. By working towards community energy goals, users can earn points that can be redeemed for energy utilities discounts.
Kilowatt creates community energy goals and targets so individual households feel like they are a contributing part as opposed to competition with their neighbours. As part of a community, households will be more determined to reduce their energy usage by being able to compare their energy usage with their surrounding neighbourhood.
Kilowatt provides insights and patterns of a local area's energy usage. Councils will access to this information can find value in being able to determine energy usage trends and work with government or energy providers to create better offerings to households. Meanwhile, energy providers are able to utilise a deeper understanding of more personalised geographic and psychographic data and can provide better tailored solutions to consumers.

KILOWATT

Figure 15: Kilowatt Logo

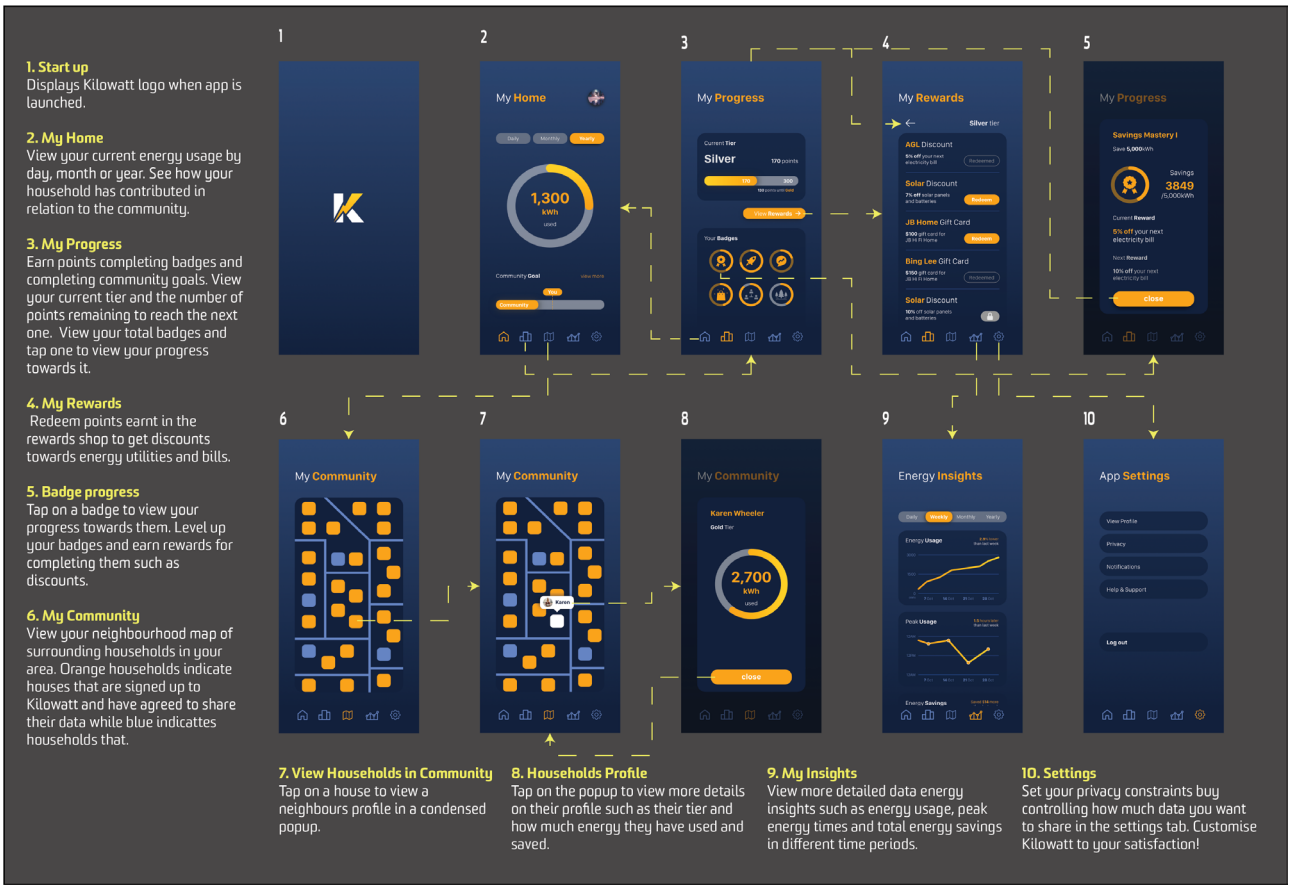

Figure 16: Design function and details of the Kilowatt app

Evaluation of Solution

Reflect on your design solution and question how your design process led to the final solution, addressing the targeted users' and industry's needs.

During the exploration of concepts, three opportunity statements were found:

- Consumer households still connected to the grid are becoming increasingly interested in having greater control and management over their energy utilities. This includes finer, more accurate, minute-by-minute live tracking and monitoring energy usage tools.

- Self-generated households are increasing in number each year and more homes are providing energy back to the local grid or energy distributor at a fixed rate. However, households seek opportunities to achieve another or better stream of revenue

- With the rise of energy usage and costs in households, there has been an increased demand in assisting consumers who aim to lower their energy costs through electricity management.

The opportunity statements revolved around the management of energy usage.

From these opportunity statements, a design brief was created to provide a criteria that the solution had to achieve, consider features that the solution had to implement and consider some constraints that solutions will be working within and around.

A,B,E, of inspiration and brainwriting exercises were taken for the ideation process. A,B,E of inspiration gave better understanding of motivations and underlying behaviours associated with the current context and how the proposed context was going to change. Brainwriting allowed ideas to be passed through each group member to provide a fresh perspective for each concept and the consideration of aspects that may have not been considered individually.

From the design brief and ideation process, three concepts were created:

- **Live energy tracking**
  Independent source of mobile energy tracking

- **Energy trading**
  Platform for users to purchase and sell their personal generated energy

- **Utilisave**
  Competitive platform that enables users to connect with one another to reduce energy usage

Feedback from the tutors and class revealed that the utilisave concept best suited for the context of utilities, as it provided an incentive platform for users to reduce household energy. Utilisave was then rebranded as Kilowatt, a mobile phone application. Kilowatt incorporates the function of live energy tracking whilst providing incentive to reducing energy usage by offering rewards for hitting community and personal targets. Kilowatt targets not only household owners but also councils as it illustrates the peak energy usage areas. Kilowatt aims to build a community around energy usage through providing community goals and rewards.

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