Faculty of Engineering of the University of Porto

Eco-Neighbours

Join the Green Challenge: Compete, Connect, Conserve!

Report

Human-Computer Interaction (IPC)

Class 5, Group 2

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1. Introduction

As part of the Human-Computer Interaction 2024-2025 unit, we need to develop a novel user interface (UI) for mobile/web app. Therefore, in this first phase we will focus on analyzing users and tasks. The objective of this phase is to deeply understand the needs, behaviors and preferences of the users who will interact with the proposed application. This understanding will guide the design of a UI that supports users in tasks such as monitoring energy consumption, reducing usage, and managing smart appliances.

2. Welcome To Eco-Neighbour

Eco-neighbors is an innovative app that turns sustainability into an exciting and interactive experience for communities. Designed to promote eco-friendly habits, the app encourages you to actively engage with your neighbors in fun, competitive challenges that promote environmental awareness and positive change. Whether it's reducing energy consumption, recycling, or conserving water, you can complete a variety of eco-friendly tasks and earn points for your efforts, all while contributing to the health of the planet.

With Eco-Neighbors, you can easily track your sustainability score, monitor your progress, and compete with others to see who can claim the coveted title of "Most Sustainable Home." The app also functions as a social platform, allowing you to share valuable eco-friendly tips, ideas and tricks with your neighbors, encouraging creativity and collaboration in your community.

3. Related Apps/Services

App that educates and mobilizes your people to take action toward your company's sustainability goals. JouleBug offers a variety of challenges, tips, and activities that encourage users to reduce energy consumption, minimize waste, and make greener choices on a daily basis.

Mobile app that shows you how much energy your home and individual devices are consuming in real time. It helps you find ways to save money and reduce your carbon footprint, by offering personalized insights.

OhmConnect is an app that rewards users for saving energy by reducing electricity consumption during peak demand times, known as "*OhmHours*" or "*AutoOhms*." By cutting back energy use during these periods, users help prevent blackouts and lower reliance on fossil fuel

power plants. In return, they earn points that can be redeemed for cash, prizes, or charitable donations.

EnergyHub

Home Energy Monitoring System that works with utilities and smart devices to provide users with information on their energy usage, track trends, and reduce energy consumption.

4. Questionnaire highlights

The study targeted users interested in energy conservation, encompassing a diverse group of homeowners, renters, and community members of various age groups. Participants were asked to provide feedback through a structured questionnaire, which focused on their awareness of energy consumption, their engagement in eco-friendly challenges, and the app's features that allow users to compare their energy usage with that of their neighbors.

A total of 42 respondents completed the questionnaire, offering valuable insights into user preferences, behaviors, and attitudes toward energy usage. These responses helped to shed light on how participants interact with the app and how it can be further tailored to encourage sustainable habits within communities.

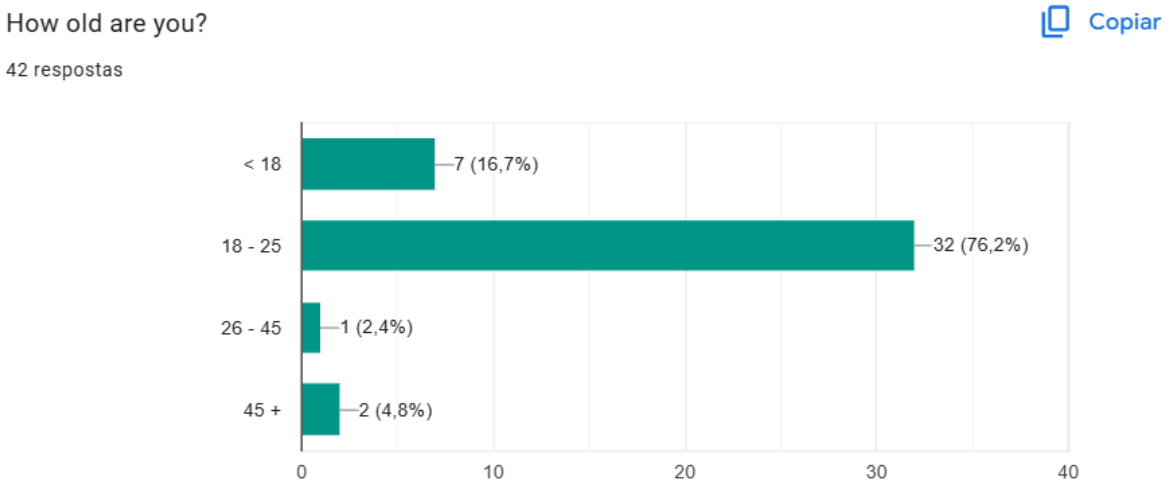


Figure 1- Age rates

Through the extracted data we realized that the main interests of these age groups are:

- **< 18** - lower awareness of energy consumption but may be interested in gamified experiences and peer comparisons
- **18- 25** - shows a moderate understanding of energy-saving practices and is likely to be in a transitional phase, such as moving away from home, starting college, or entering the workforce; interested in energy-saving challenges, especially if they include social aspects and tangible rewards.
- **26- 45** - More likely to own homes and be conscious of energy consumption for both financial savings and environmental concerns; may appreciate data-driven insights and comparisons to their neighbors.
- **+ 45** - May be less engaged with technology but are generally concerned about financial implications and environmental impact; more interested in the practical benefits of tracking energy usage.

In addition to this information, through the questionnaire we realized that the fact that the population receives notifications about their consumption levels is one of the most accepted ideas.

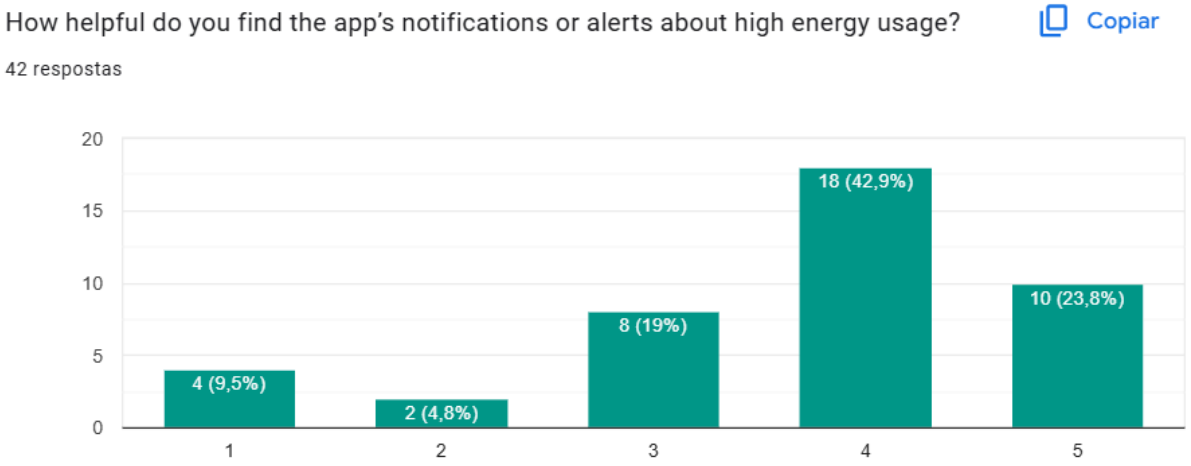


Figure 2- Responses about the idea of notifications on the app

5. PACT Analysis

5.1 People

Co-Neighbors targets a diverse range of users based on age groups, each with different levels of engagement with sustainability and technology.

Wide user base (teenagers to 45+), with differing motivations for engagement (social, financial, environmental). The app must accommodate varying levels of tech comfort and environmental consciousness.

5.2 Activities

The app offers a variety of activities focused on encouraging sustainability through competition, social interaction, and practical actions:

- **Eco-Friendly Challenges**: Users participate in sustainability competitions, such as reducing energy consumption, recycling, or conserving water. These tasks promote eco-friendly habits through **gamified challenges** and **neighborhood rankings**.
- **Tracking Energy and Resource Usage**: The app enables users to track their **energy, water, and recycling performance**. It offers real-time data and historical insights on individual and neighborhood consumption patterns.
- **Sharing Tips and Ideas**: Users can post and share eco-friendly tips, encouraging creativity and collaboration within their community. This fosters a sense of engagement through social media-like interaction.
- **Points and Rewards**: The app incentivizes users with a point system based on completing eco-friendly tasks, which can be exchanged for rewards or badges, adding a **competitive element** to sustainability.

5.3 Contexts

The app will be used in various environments, depending on the target age group and user lifestyle:

- **Home**: For most users (especially homeowners), energy and water tracking will likely occur within the home environment, where they can directly apply the app's suggestions.
- **Social/Community Environment**: Users will engage in activities that involve neighbors and community members, participating in challenges, and sharing tips. The **social context** of the app is crucial for fostering a collaborative, competitive atmosphere.
- **School/Workplace**: For younger users (especially <18 and 18-25), the app may be used in school or workplace settings, where peer interaction and challenges can be an additional motivator.
- **Cultural Context**: Different communities may prioritize sustainability practices differently. Co-Neighbors should be flexible in supporting various eco-friendly activities, taking local culture and environmental focus into account.

5.4 Technologies

Co-Neighbors is a **mobile app** with features focused on accessibility, gamification, and data analysis. The app will include the following technological aspects:

- **User Interface**: A simple, visually engaging UI that caters to a broad range of users, including those with lower tech-savviness (especially for the 45+ age group). A simple and easy navigation is essential.
- **Real-Time Data Monitoring**: The app integrates with home energy monitoring systems (e.g., smart meters) and water tracking devices to provide real-time consumption data.
- **Social Features**: Users can compete with neighbors and share eco-friendly tips. This builds a **community-driven environment** that all users will find appealing.
- **Gamification**: The app's **points system** and **leaderboards** foster a sense of competition and achievement, motivating all user groups, but especially appealing to younger audiences.
- **Cross-Platform Support**: The app will be available on **iOS and Android**, with potential integration with **wearables** or **smart home devices**.

6. Personas

6.1. Jakub Kowalski

Age: 25
Education: Vocational School Degree
Occupation: Electrician
Family: Two toddler brothers
Location: Kraków, Poland
Tech proficiency: Average
Archetype: Hands-on Problem Solver

Pragmatic Frugal Resourceful

Figure 3- Jakub

"Why not find better ways to manage what we've got?"

Narrative/Lifestyle:

Jakub leads a practical life, taking pride in managing his household hands-on. Since his brothers were born, he's become more connected to his neighborhood and enjoys engaging in community energy-saving challenges with them. Jakub values spending time with his brothers, whether on trips or working on home projects. Conscious about money, he prefers cutting expenses through small changes. He's particularly interested in tools that help him compare his energy usage to neighbors and respond to high consumption alerts, as it helps him stay on budget and connect with both his brothers and the community.

Objectives/Needs:

- Reduce electricity and heating bills to maintain financial independence.
- Simple, easy-to-use tools for daily energy management.
- A clear view of home energy use for better decision-making.
- Teach his brothers about conserving resources.
- Connect his family with the neighborhood.

Frustrations/Pain Points:

- High winter utility bills with reluctance to spend upfront to fix them.

- Dislike for overly complex tech.
- Frustration when energy cuts don't lead to noticeable savings.
- Difficulty finding low-cost, practical energy-saving tips.

6.2. Emilia Rinaldi

Age: 16
Education level: Middle school
Work/ occupation: High school student
Family: Single child
Location: Bologna, Italy
Technology proficiency: Average
Preferred devices: Smartphone, tablet, smart TV
Archetype: The "Budget-Conscious Daughter"

Collaborative Organized Thoughtful

Figure 4- Emilia

"I like to think that being mindful in little ways can lead to a big difference in life"

Narrative/Lifestyle:

Emilia is a 16-year-old high school student, and as an only child, she takes on more responsibility around the house to help her parents manage things. Though she's not very tech-savvy, Emilia appreciates apps that help her organize her schoolwork and household tasks more easily. She's budget-conscious and always looking for ways to reduce household expenses, especially energy bills, to support her family. Emilia enjoys discussing energy-saving tips with her friends and is motivated to adopt small eco-friendly habits to benefit both her family's budget and the environment. She likes the idea of making her home more energy-efficient, knowing it will help her parents and reduce their bills.

Objectives/Needs:

- Emilia wants to help her parents by cutting down on monthly expenses, particularly household utility bills.
- She prefers technology that fits easily into her daily life and is simple to use without requiring much effort.
- Gaining more insight into how her family's energy is used could help her feel more in control of her family's budget.

- She cares about the environment and wants her family to adopt responsible energy habits, even if it's small steps like turning off lights or using less water.

Frustrations/Pain Points:

- Emilia often finds that the family's utility bills are inconsistent, making it hard to help her parents plan the monthly budget.
- She doesn't want to waste time learning how to use complicated apps or gadgets that don't offer immediate, visible benefits.
- She feels there isn't enough straightforward advice on how to make simple, effective changes at home to reduce energy consumption without expensive investments.
- Emilia gets frustrated when small changes she makes at home don't lead to noticeable savings or improvements in energy efficiency.

7. Activity scenarios

7.1. Jakub Kowalski

After a long day at work, Jakub sits down with a cup of tea and opens **EcoNeighbour** on his phone. He's curious about how his household's energy consumption compares to others in the area. He's surprised to see that his home is using more electricity than his neighbors, especially during the evening. The app recommends turning off unnecessary lights and setting timers for electronic devices. Jakub decides to give it a try, setting a good example for his toddler brothers by turning off lights and gadgets when not in use.

7.2. Emilia Rinaldi

Emilia finishes her morning writing session and takes a break. She opens **EcoNeighbour** to check how her family's energy use compares to others in her neighborhood. She notices that her electricity usage is slightly above average compared to nearby households. Curious, she digs deeper into the app's suggestions and finds simple tips like unplugging unused appliances and adjusting the thermostat. Motivated, she shares the insights with her parents over dinner, encouraging them to be mindful of small habits that can make a difference.

8. Functionalities

User Management

- *The app should enable users to:*
    - Log in using their email or social media accounts.
    - Create a new user account by providing personal information (name, age, address).
    - Reset their password if forgotten.

Energy Usage Tracking

- *The app should enable users to*:
    - Input their energy consumption data manually or sync with smart meters.
    - View detailed visualizations of their energy usage over time.
    - Set and track personalized energy-saving goals.

Comparison Features

- *The app should enable users to:*
    - Compare their energy usage with that of neighbors or similar households.
    - View metrics and benchmarks for energy consumption based on user demographics.
    - See historical data to understand their consumption trends relative to the community.

Challenges and Competitions

- *The app should enable users to:*
    - Participate in neighborhood-wide energy-saving challenges.
    - Join seasonal challenges that encourage specific energy-saving actions (e.g., reducing heating in winter).
    - Track their progress in these challenges through a leaderboard feature.

Notifications and Alerts

- *The app should enable users to:*
    - Receive notifications for high energy usage alerts.
    - Get reminders for actions they can take to reduce energy consumption based on their current usage.
    - Set preferences for how often they receive these notifications..

Social Features

- *The app should enable users to:*
    - Share their energy-saving achievements on social media.
    - Invite friends or neighbors to join challenges or competitions.
    - Select who has access to their energy usage data.

Educational Resources

- *The app should enable users to:*
    - Access articles, tips, and resources on energy-saving techniques.
    - Receive personalized recommendations based on their energy usage patterns.

Rewards and Recognition

- *The app should enable users to:*
    - Earn rewards (badges, points, discounts) for participating in challenges and achieving energy-saving goals.
    - Claim rewards in collaboration with local businesses and services that promote energy efficiency.
    - View a summary of their rewards status and achievements within the app.

User Support

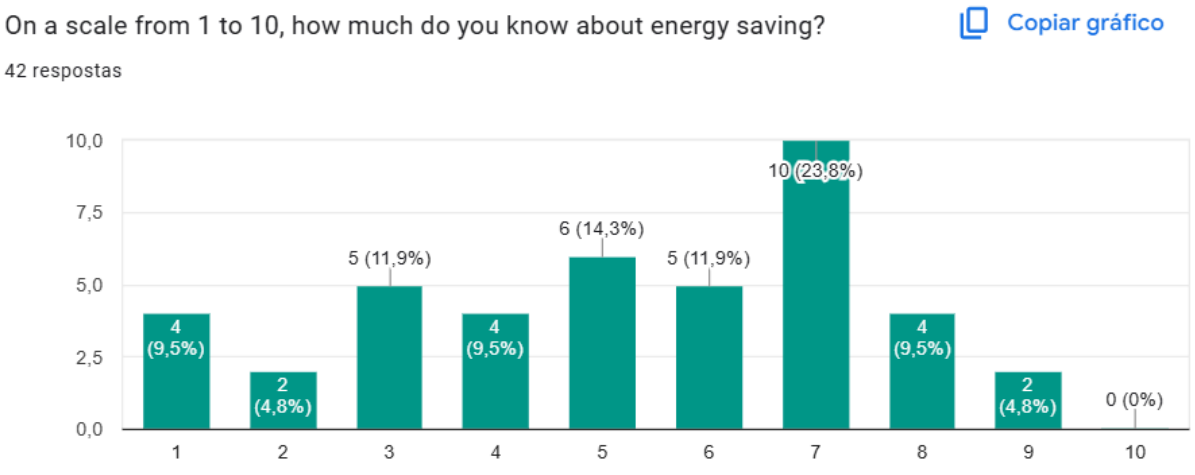
- *The app should enable users to:*
    - Access a help section with FAQs, troubleshooting tips, and customer support options.
    - Provide feedback or report issues regarding app functionality.
    - Connect with other users for peer support and sharing best practices in energy conservation.

9. Annexes

9.1. Questionnaires

1. How old are you?
2. On a scale from 1 to 10, how much do you know about energy saving?
3. Are you conscious about your energy consumption?
4. How often do you track your energy consumption?
5. How would you feel about comparing your energy usage with that of your neighbors or other households?
6. How likely are you to participate in neighborhood or community-wide energy-saving challenges?
7. Would rewards or recognition incentivize you to participate in community challenges to reduce energy consumption?
8. Would you find it useful to compare your energy usage against households of similar size or composition?
9. How helpful do you find the app's notifications or alerts about high energy usage?
10. How likely are you to take action after receiving an alert that your energy usage is higher than usual?
11. Would seeing your overall environmental impact encourage you to adopt more eco-friendly practices?
12. How helpful would peer advice be in helping you reduce your energy consumption?
13. How valuable is it for you to understand seasonal energy usage trends in your home?
14. How likely are you to act on an alert that your energy usage exceeds similar households?
15. How likely are you to set and actively pursue energy goals if the platform provided personalized tips?

9.2. Summary of results



Are you conscious about your energy consumption?

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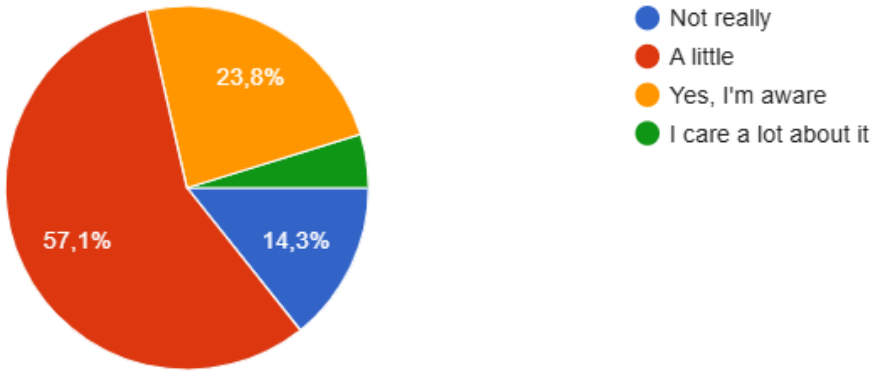

How often do you track your energy consumption?

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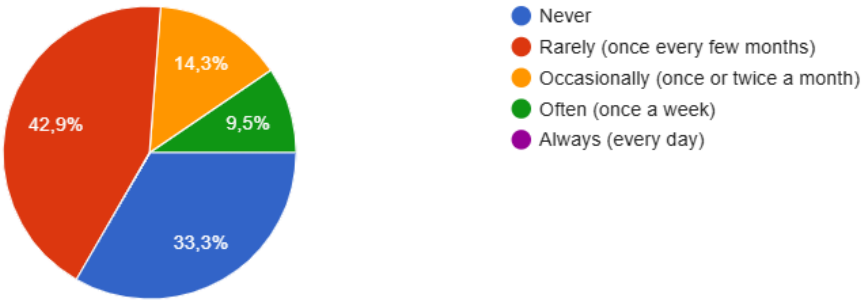

How would you feel about comparing your energy usage with that of your neighbors or other households?

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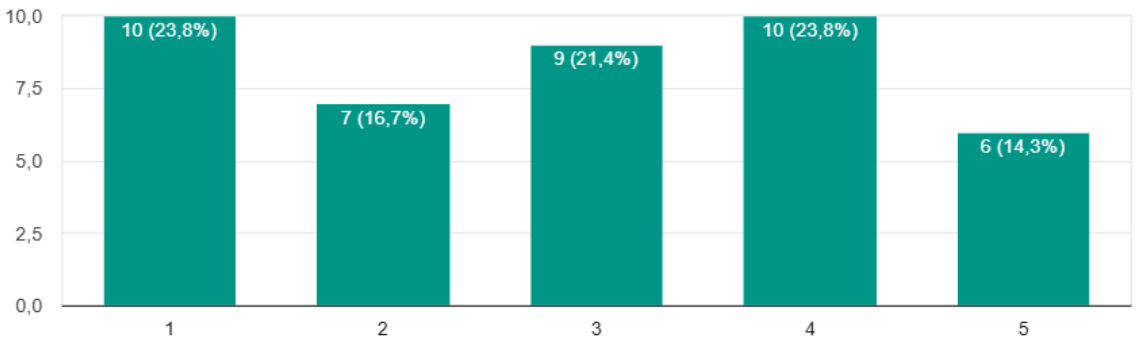

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How likely are you to participate in neighborhood or community-wide energy-saving challenges?

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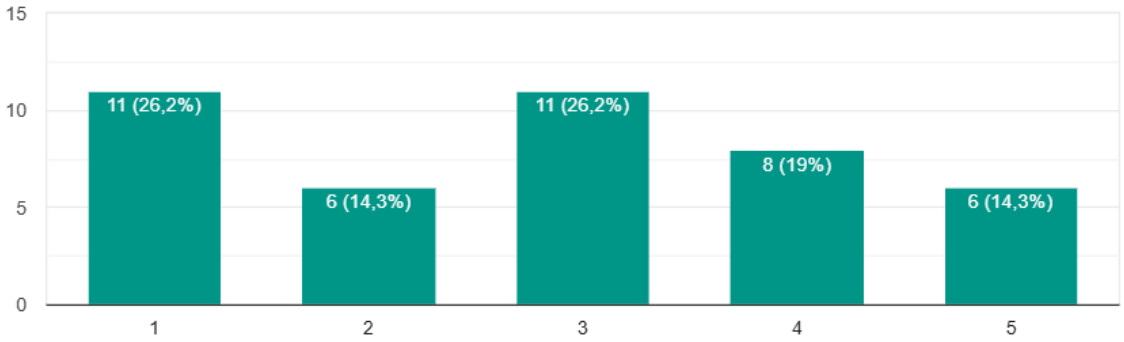

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Would rewards or recognition incentivize you to participate in community challenges to reduce energy consumption?

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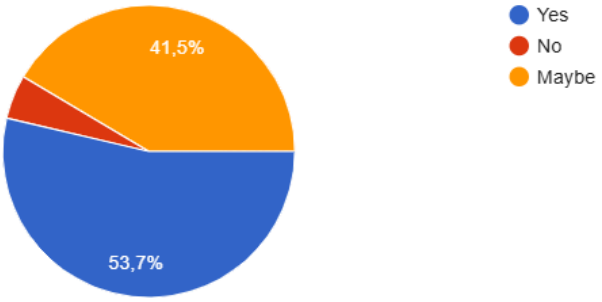

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Would you find it useful to compare your energy usage against households of similar size or composition?

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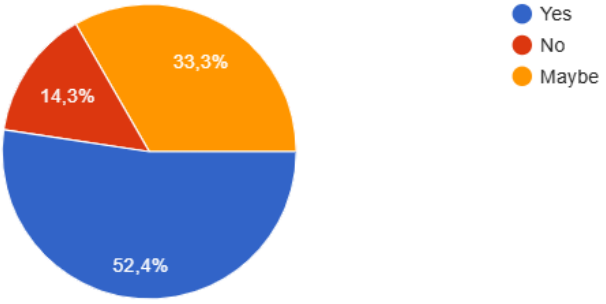

How likely are you to take action after receiving an alert that your energy usage is higher than usual?

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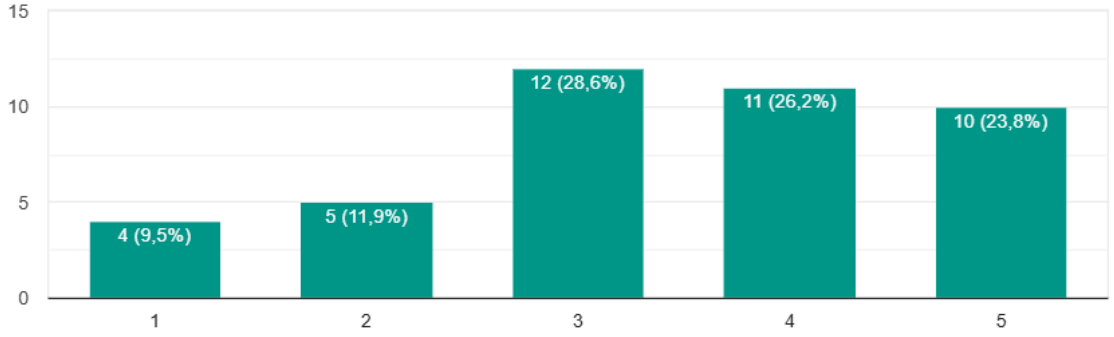

Would seeing your overall environmental impact encourage you to adopt more eco-friendly practices?

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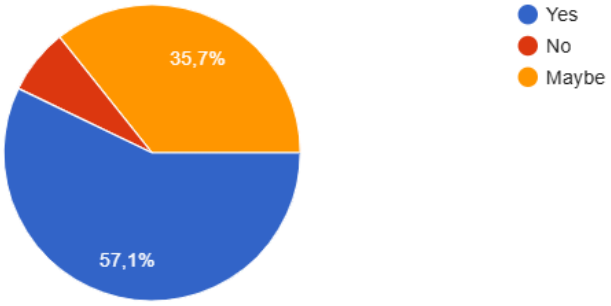

How helpful would peer advice be in helping you reduce your energy consumption?

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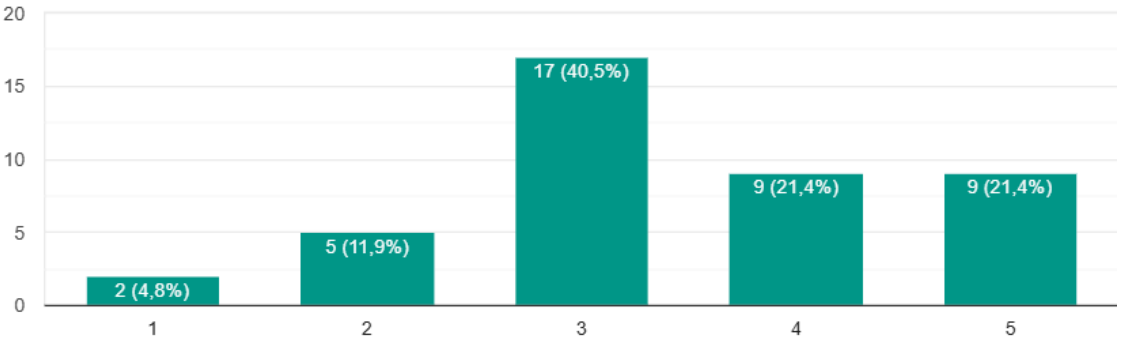

How valuable is it for you to understand seasonal energy usage trends in your home?

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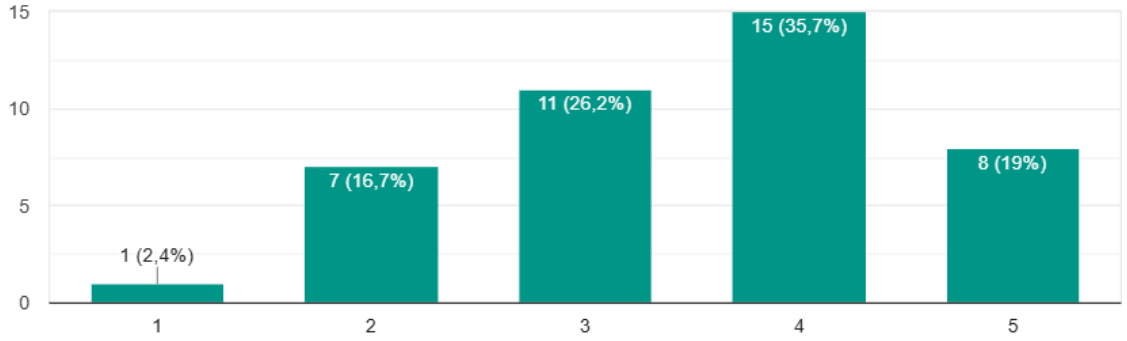

How likely are you to act on an alert that your energy usage exceeds similar households?

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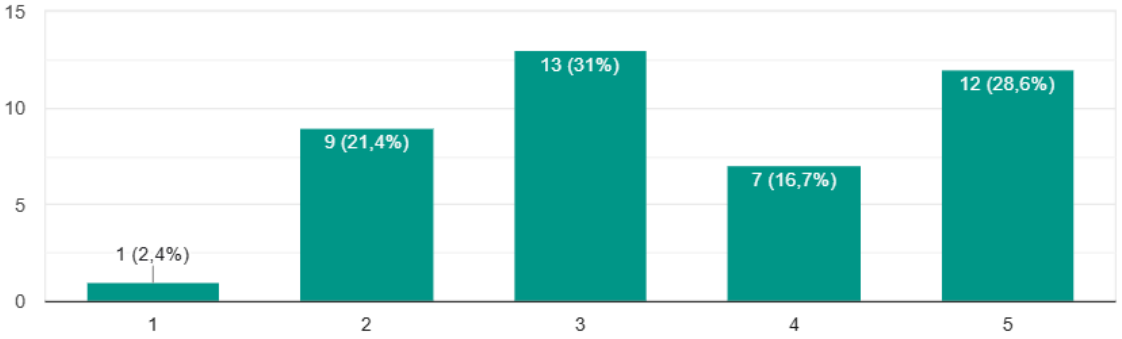

How likely are you to set and actively pursue energy goals if the platform provided personalized tips?

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