Faculdade de Engenharia da Universidade Do Porto

+ENERGY a Energetic Plan Advisor Application

Antero Cabral Marques Morgado
Carlos Ferreira Marta Carreira da Costa
João André Rey Torres
João Pedro Saraiva Martinho
Mariana Marques Maio Pereira

Project developed within the scope of the Interação Pessoa Computador course L.EIC022

Professor: Thiago Sobral Marques da Silva

October 2024

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1. Project’s Idea Description

The concept behind **+ENERGY** is to help Portuguese consumers choose the ideal energy plan for their specific needs, promoting informed, and personalized decisions. With the ever-increasing number of energy plans available today, each catering to different user profiles and personal preferences, many consumers find the process confusing and overwhelming.

+ENERGY aims to simplify this decision-making process by offering a user-friendly, efficient, and practical tool that provides tailored recommendations. By analyzing factors such as household size, energy consumption patterns, and preferences for renewable energy, the application would present users with the most suitable options, helping them save both time and money.

Key features include a **comparison tool** to evaluate various plans, **real-time updates** on energy prices, and **filters** for customizable recommendations based on budget, energy source, or contract flexibility. Additionally, **+ENERGY** promotes sustainability by highlighting renewable energy plans, empowering users to make choices that benefit both their wallets and the environment.

The ultimate goal is to make energy plan selection more accessible, empowering consumers with the knowledge and tools they need to make informed decisions.

2. Related Services

2.1. *DECOproteste*

A relevant example of a service that +ENERGY will be connected to is the DECOproteste simulator. This tool begins by asking users for details such as the city they live in and the type of energy they wish to compare (gas, electricity, or both). It also gathers information about the household, including the number of residents and whether their energy consumption is high, moderate, or if they can provide precise consumption data [1][2].

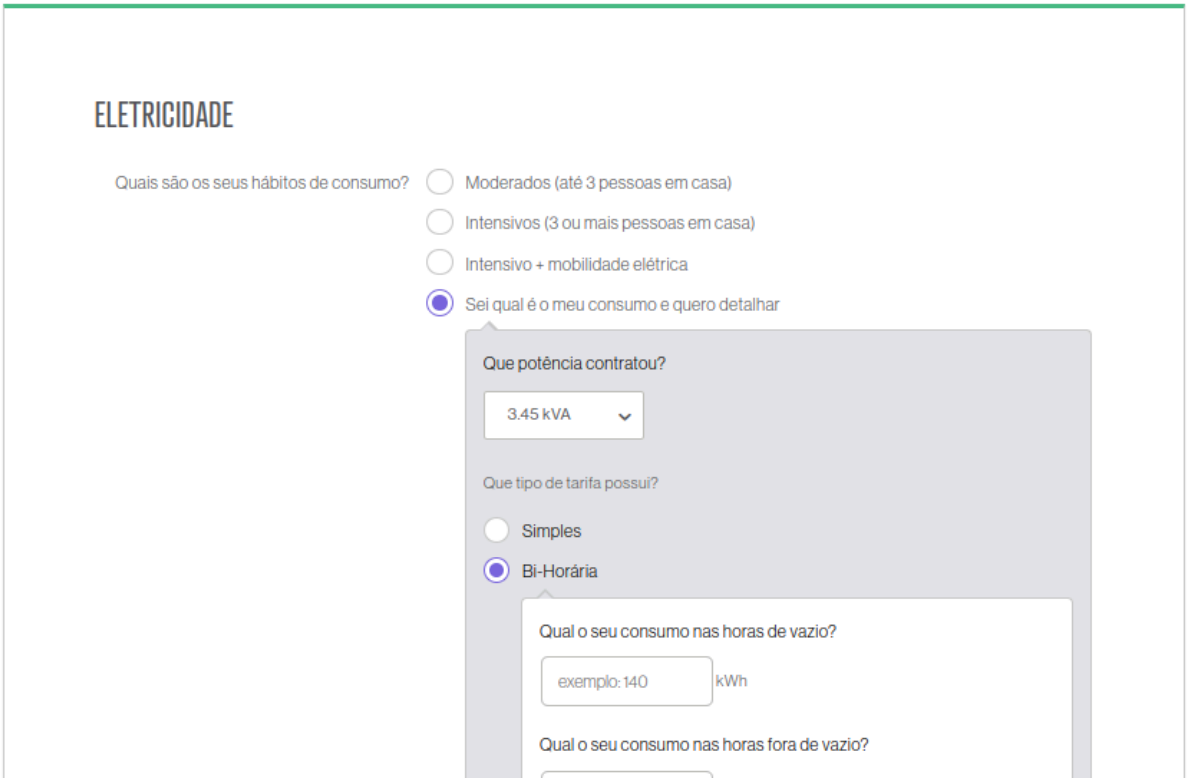

Figure 1: "DECOproteste simulator"

Source: DECOproteste (2024)

In the end, the simulator presents the best energy plans that match the user's needs, along with the respective companies and estimated annual prices.

2.2. *Poupa Energia*

Another similar service is the website poupaenergia.pt. In this website, users are able to browse available energy plans. They can also answer a questionnaire regarding their household residents, their appliances, their billing and suppliers and even track their consuming habits in order to get the best energy and gas plan recommendation [3].

Figure 2: "Poupa Energia simulator"

Source: Poupa Energia (2024)

Overall, this questionnaire is very in depth, allowing for a precise simulation for the user's wants.

3. Questionnaire Highlights

A questionnaire is crucial in app development as it gathers valuable insights directly from potential users. It helps identify user needs, preferences, and pain points, ensuring that the app is designed with the target audience in mind. By prioritizing features based on user feedback, usability and satisfaction can be enhanced.

Here are the highlights of the +ENERGY questionnaire that was conducted:

Who answered?

53 individuals, primarily individuals aged **18-25**.

How familiar are you with energy plans?

A mix of responses, with some knowing about energy plans, while others are unfamiliar (62.3% are familiar; 37.7 aren't).

Have you chosen an energy plan before?

Majority has **not** chosen one (81.1%).

What key factors do you consider when choosing a plan:

Price (monthly/annual) (86.8%) and **stability** (54.7%) are the most frequently mentioned factors.

Have you already used digital tools for this?

Most respondents have **not** (90.6%) used any digital tools.

Can you interpret energy bills?

Most can´t, with only 25% able to interpret their bills.

Would you use a mobile application to assist you in choosing your energy plan or to receive suggestions for saving on energy consumption?

The majority would use a mobile application for this purpose (94.3%).

Are you willing to pay for consulting services?

This question on willingness to pay for energy consulting shows an interesting spread across various price ranges. It's notable because responses are quite evenly distributed, reflecting diverse opinions on how much people value this service. Here's a breakdown:

- **18.9%** are **not willing to pay**.
- **17%** would pay **up to 5€**.
- **17%** are comfortable with paying **between 5€ and 10€**.
- **17%** would pay **only if savings are guaranteed**.
- **15.1%** could pay **between 10€ and 20€**.
- **13.2%** are willing to pay **up to 2.5€**.
- A small **1.9%** would even pay **more than 20€**.

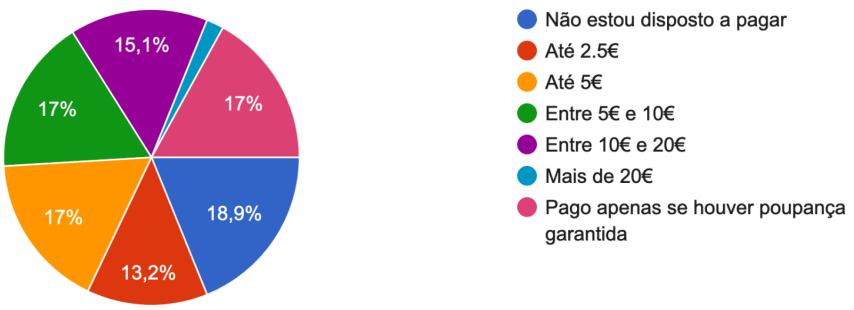

Chart 1: "Responses regarding the fair amount to pay for the advisory service"

This pie chart highlights how some people see value in energy consulting, while others are more cautious, making it a very intriguing aspect to explore further.

A mobile application that could advise people on the choice of an energetic plan seems promising. The majority of people have never chosen a plan (and will eventually need to), have never used digital tools for it (maybe lack of advertisement or weak performance from the tools that already exist), can't really interpret the information on the energy bills and would use a mobile app for it.

4. PACT Analysis

The PACT analysis framework provides a structured approach to human-centered design. The acronym PACT stands for the key elements People, Activities, Context, and Technologies. In this analysis, the questionnaire results were considered to assess each element in relation to the app, thereby clearly defining its functionality and goals.

4.1. People Analysis

4.1.1. Physical attributes

Age: users could range from young-adults (18-25) to seniors (60+), with the primary demographic being adults (18-60) as observed in the questionnaire.

Size & Reach: the user interface needs to be optimized for touch devices, considering varying hand sizes and reach for mobile users. Buttons should be appropriately spaced to prevent accidental selections.

Visual Angles: visual accessibility should account for users with weaker eyesight (e.g., older demographics), ensuring high contrast, clear fonts, and legible text size.

4.1.2. Perceptual abilities

Vision: the design should accommodate users with limited vision by utilizing readable font sizes and being optimized for use with screen readers to ensure accessibility.

4.1.3. Cognitive abilities

Users exhibit different cognitive abilities based on age and familiarity with technology. Cognitive demands should be minimized by providing clear instructions and an intuitive flow.

Memory Span: younger users can handle complex flows, while older users may prefer more straightforward ones. The app should be easy to navigate and offer aids to reduce reliance on short-term memory.

Energy literacy: a lot of users have difficulty interpreting energy data, bills, and plans. Having simple explanations and tooltips can help explaining complex terms.

4.1.4. Personality and social traits

Users have different likes and dislikes. Some may enjoy interactive features, while others may prefer simple and straightforward designs. Their patience levels can differ. Users who are more familiar with technology are quicker to learn new features, while those less comfortable with technology may need more time and clear instructions to use the app.

4.1.5. Cultural and international diversity

The majority of the app users would be Portuguese, with some others being from diverse cultures. Portuguese and English would be the communication languages accessible to the majority of users. There might be users who don’t speak both languages in less numbers. To enhance usability for all, symbols and icons throughout the app should be designed to be universally recognizable, reducing the chances of misinterpretation across different cultures.

4.1.6. Special populations, (dis)abilities

The app should be designed to be inclusive for users with visual and cognitive disabilities. Features like screen reader compatibility, straightforward navigation, and clear language would help with accessibility for these users.

4.2. Activities

Currently, when people want to choose or change their energy plan (because they are moving to a new house or have an old plan), they normally research various providers online, comparing prices and contract terms. They often rely on reviews and recommendations from friends or family, which can lead to confusion due to the overwhelming amount of information available. In some cases, they may feel misled by the energy provider when they suggest a plan they don’t need. This process can be time-consuming and may result in users settling for plans that do not fully meet their needs. Additionally, many individuals may not be aware of newer, more sustainable options that could offer both cost savings and environmental benefits.
Their goal is to find the right energy plan and sometimes this is not achieved.

4.3. Context

Understanding the context where people are when in search for a new energy plan is important for application development because it helps ensure that the app meets users' needs and expectations.

Physical environment: users are likely accessing such tools in comfortable settings, such as their homes.

Social environment: while using the app the user is likely to be alone or with people with the same responsibilities as him, such as roommates or with his family.

Circumstances: users might engage with the app during periods of budget review, seeking to save on monthly bills.

4.4. Technologies

Currently, there are tools available that provide energy plan advisory services, such as those explored in Section 2 of this document. However, these tools are designed solely for web use, which distances them from the user experience. Users must navigate to the website each time they want to access energy-saving tips or compare plans, making it challenging to ensure that they are getting the best options for their needs. This is where the +ENERGY app comes in. As a mobile application, it brings energy advisory services just a click away, making it easier for users to achieve their goals.
To address the current limitations in energy plan advisory services, several key features are essential for the +ENERGY app, ensuring it effectively meets user needs:

Mobile Interface: the +ENERGY app must be optimized for mobile devices, ensuring that users can easily input data on energy usage, expenses, and preferences.

Payment Integration: payment options for premium features should be available in the app, making it easy for users to upgrade to advanced features as needed.

Energy Plan Database: the app should have an updated database of energy providers and plans, enabling users to compare available choices.

Recommendation Algorithms: the app should use algorithms to suggest tailored energy plans and tips for reducing expenses based on user input, offering personalized recommendations for cost and energy savings.

Data Visualization: clear and user-friendly data visualization tools are essential for comparing different energy plans and to visualize patterns of energy consumption, which will help users understand their habits and make informed decisions.

Automation Tools: features like scheduled notifications with energy-saving tips can help users to adopt energy-efficient habits effortlessly, such as reducing consumption during off-peak hours.

5. Personas

5.1. João Silva, 23 years

Occupation: University Student (MSc in Mechanical Engineering)
Location: Porto, Portugal
Leisure Activities: Enjoys playing football with friends, watching cartoon series, and is passionate about sustainability and technology. He owns a dog named Billy.

Goals:

- Find a stable, affordable energy plan to split with roommates.
- Prioritize renewable energy options, as sustainability is a key factor for him.
- Stay within a tight student budget and avoid hidden fees.

Attitudes and Skills:

- Comfortable using digital tools and apps.
- Cares about making eco-friendly choices, but he's not an expert on energy plans and relies on recommendations.
- He likes to receive constructive criticism so he can improve as a human being.
- Skilled at navigating technology but tends to avoid overly complicated setups.

Challenges:

- Needs a plan that balances price and environmental impact without complicated fees.
- Limited budget means João is not willing to pay for advisory services unless there are guaranteed savings.

5.2. Ricardo Tavares, 44 years

Occupation: Credit Analyst

Location: Espinho, Portugal

Leisure Activities: Enjoys playing with his children (10 year old daughter and 7 year old son), romantic dinners with his wife, walking his dog.

Goals:

- Lower his monthly energy bills with a competitive, budget-friendly plan.
- Predictable pricing through a fixed-rate tariff to avoid surprise costs.
- Easy and smooth switching process with minimal disruption to his household.
- Responsive customer service for any issues with billing or energy supply.
- Convenient payment options for easy bill management.

Attitudes and Skills:

- Cost-conscious and focused on budgeting.
- Risk-averse, particularly when it comes to switching plans or providers.
- Moderately environmentally conscious, but prioritizes affordability.
- Service-oriented, highly valuing responsive customer support.
- Very financially literate and has an ability to analyze pricing models and contracts.
- Data-driven decision-making, using logical comparisons to choose the best energy plan.
- Basic energy usage awareness, understanding what influences his family's consumption and looking for ways to optimize it.

Challenges:

- Struggles to weigh and compare all the variables in different energy plans.
- Dislikes long-term contracts that may restrict his flexibility.
- Uncertain about how to further reduce his household's energy consumption.
- Skeptic towards lesser-known energy companies, limiting his options.
- Isn't particularly tech-savvy.

6. Scenarios

6.1. João Silva scenarios

6.1.1 Activity scenario 1 - João Silva

João has been feeling the pressure of managing his living expenses as he enters his fifth year of his master's degree. Wanting to prioritize sustainability, he decides to use the +ENERGY app to find a better energy plan. He opens the app and enters his monthly expenses and preference for renewable energy. The app quickly presents tailored options, highlighting the most affordable plans for him and his roommates. João appreciates the app's easy-to-understand comparisons, which allow him to evaluate cost and environmental impact. After discussing the top choices with his roommates, they confidently select a new plan together. With the transition seamless, João feels satisfied knowing they made an eco-friendly choice that fits their budget.

6.1.2. Activity scenario 2 - João Silva

João has always been conscious about his environmental impact, but recently he's been thinking about ways to make his energy consumption more sustainable while also lowering his monthly bills. He decides to explore the +ENERGY app. After reviewing his energy usage, the app suggests a few practical habits, such as reducing standby power by unplugging devices and using energy-efficient appliances. João also receives tips on scheduling his electricity usage during off-peak hours to take advantage of lower rates. By following these suggestions, João can make his home more eco-friendly while cutting down on energy expenses.

6.2. Ricardo Tavares Scenarios

6.2.1. Activity scenario 3 - Ricardo Tavares

Ricardo has been noticing his energy bills creeping up each month. Concerned about his family's budget, he decides to use the +ENERGY app to find a more affordable plan. He opens the app and inputs details about his household, including the number of family members and their energy consumption patterns. The app quickly generates a list of suitable energy plans, and Ricardo uses the comparison tool to filter options based on customer ratings, fixed rates, and terms. He discusses the top choices with his wife, ensuring they select a reliable provider. The app guides him through the switching process seamlessly,

minimizing disruption to their daily routine. With the new plan confirmed, Ricardo feels relieved, confident that he made a well-informed choice for his family’s finances.

6.2.2. Activity scenario 4 - Ricardo Tavares

Ricardo Tavares is eager to reduce his household's energy consumption and teach his children about sustainability. He opens the +ENERGY app to explore practical ways to save energy. After entering data regarding his appliances, the app recommends switching from incandescent bulbs to LED lights, which use 75% less energy. Motivated by this suggestion, Ricardo heads to the nearest department store to purchase LED lights. When he returns home, he replaces the old bulbs and takes the opportunity to explain to his daughter why this change is important for both their family budget and the environment. At the end of the month, Ricardo checks the electricity bill and is pleased to see that their efforts have paid off, with a noticeable reduction in their energy costs. This experience not only teaches his children valuable lessons about sustainability but also helps the family save money.

7. Functionalities

7.1. Personalized plan recommendation

- **User Profile Setup**: Upon sign-up, users input details such as household size, location, estimated energy usage, and preferences (e.g., renewable energy, budget-conscious plans).
- **Energy Consumption Analysis**: The app asks for past electricity bills or estimates current consumption based on appliances, household size, and usage patterns.
- **Tailored Plan Suggestions**: Using **this** data, the app recommends the top 3–5 plans that match the user's preferences, such as the lowest cost, green energy focus, or flexible contract terms.

7.2. Consumption optimization suggestion

This feature helps users reduce energy consumption and costs by providing personalized tips based on their habits and energy plan.

- **Consumption Analysis**:
    - Users fill out a questionnaire about household habits (appliance usage, heating, etc.), or the app integrates with smart meters for real-time data.
    - The app identifies high-consumption periods and potential inefficiencies.
- **Personalized Energy-Saving Tips**:
    - **Appliance Use**: Suggests running appliances like washing machines during off-peak hours (if on a time-of-use plan).
    - **Temperature Adjustments**: Recommends lowering heating or increasing air conditioning temperatures slightly.
    - **Standby Devices**: Advises users to turn off devices left on standby or use smart power strips.
    - **Lighting**: Recommends switching to LED lights or using motion sensors.

7.3. Plan comparison tool

- **Side-by-Side Comparison**: Users can select several plans and compare them on key factors like price per kWh, renewable energy percentage, contract length, and hidden fees.

- **Sort and Filter Options**: Users can sort the comparison results by different criteria (e.g., lowest price, highest renewable content) or apply filters for things like "no long-term contracts" or "budget under €50/month."
- **Highlight Best Match**: The app highlights the plan that offers the best balance between cost, green energy, and flexibility based on user input.

8. Appendix

8.1. Questionnaires

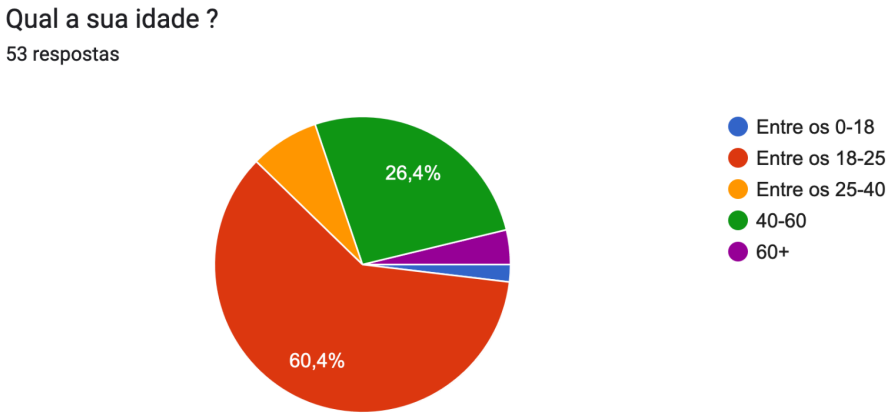

Chart 2: "Responses regarding the age of the respondents”

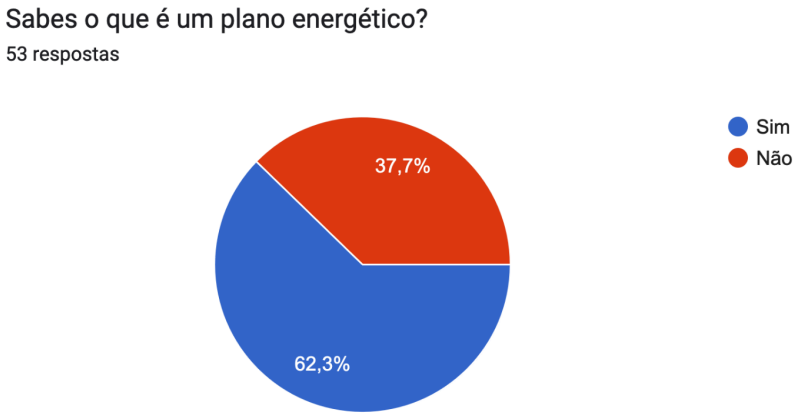

Chart 3: "Responses about knowing what a energetic plan is”

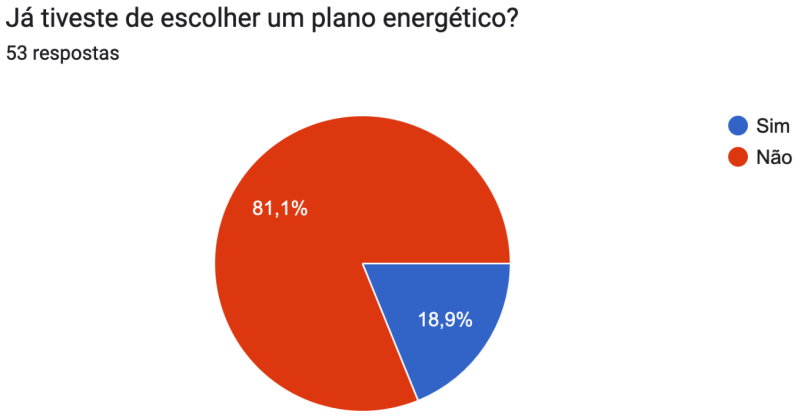

Chart 4: "Responses for the question: «Have you had to choose a energetic plan before?»”

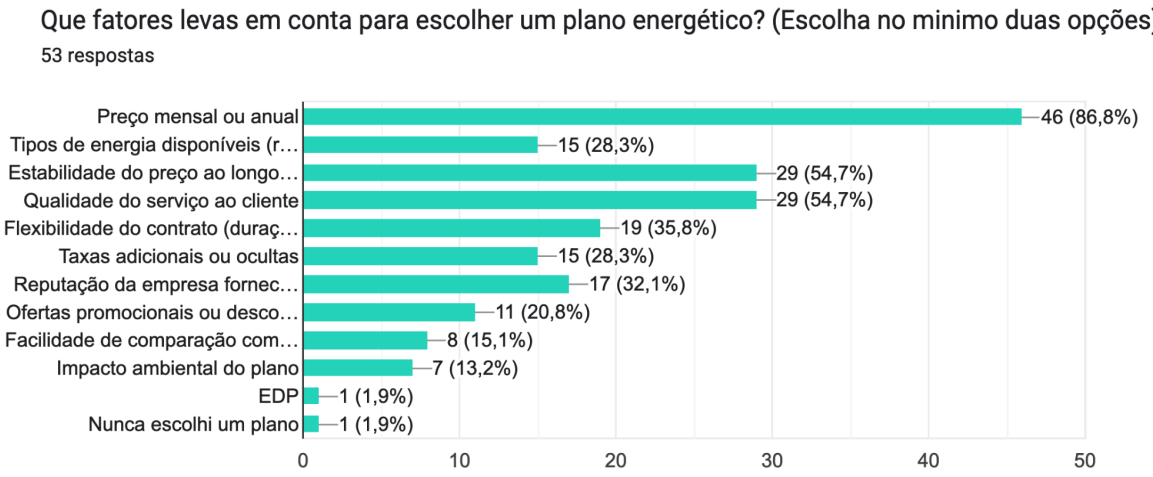

Chart 5: "Factors people take in consideration when choosing their plan"

Chart 6: "Responses for the question: «Have you ever used a digital tool for energy plan advisory?»

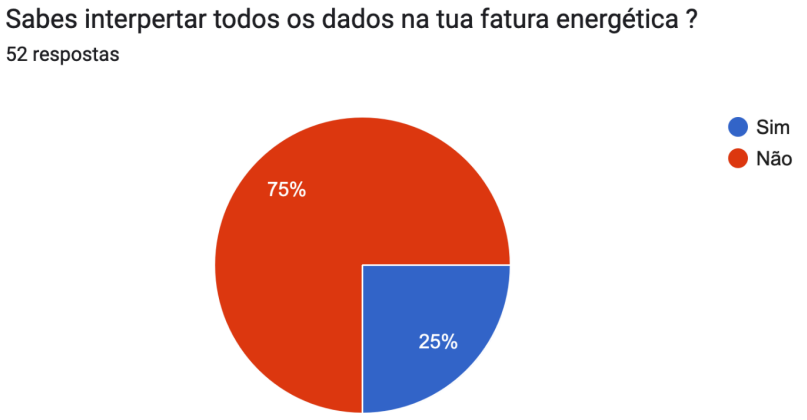

Chart 7: "Response for the question: «Do you understand all the data in your energetic receipt?»

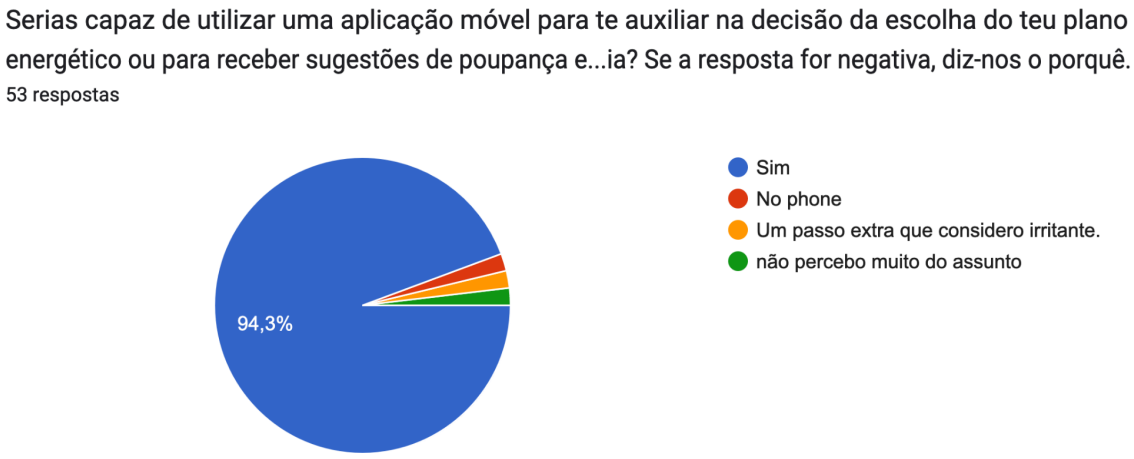

Chart 8: "Responses about the willingness to use an mobile application to advise about energetic plans and to give tips about energy use"

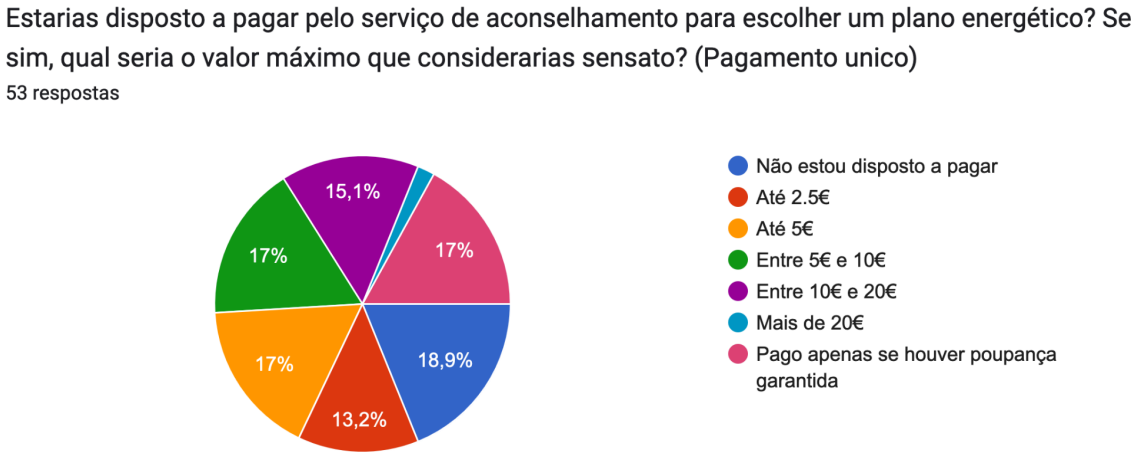

Chart 1: "Responses regarding the fair amount to pay for the advisory service"

[+ENERGY Questionnaire]

8.2. Summary of results

The questionnaire gathered responses from 53 individuals, mostly aged 18-25. While **62.3%** of them are familiar with energy plans, a much smaller percentage (**25%**) can actually interpret their energy bills. This suggests that even though many people know about energy plans, they lack a deeper understanding of the specifics, like reading their bills.

Interestingly, **81.1%** of the respondents have never chosen an energy plan themselves, showing that despite some awareness, few have actively engaged in making these

decisions. When it comes to what influences their choices, **price** is the dominant factor, with **86.8%** highlighting it as key, followed by **price stability** at **54.7%**.

In terms of using technology to assist in making these decisions, the vast majority (**90.6%**) haven't used digital tools, suggesting either a lack of available options or awareness of such tools.

One of the more intriguing findings is the question of whether respondents would be willing to pay for energy consulting services. The answers are spread across different price points:

- **18.9%** wouldn't pay anything.
- **17%** would only pay if there were guaranteed savings.
- **13.2%** would pay up to **2.5€**, while others (**17%**) are open to paying up to **5€**.
- Another **17%** are comfortable paying between **5€ and 10€**, and **15.1%** would even consider **10€ to 20€**.
- A small percentage (**1.9%**) are willing to pay over **20€**.

This diversity in responses indicates that while there's interest in consulting, people have different perceptions of its value, likely linked to how much they think it will save them in the long run.

Bibliography

[1] DECO PROTESTE, “Como escolher Fornecedor Eletricidade e Gás | DECO PROteste,” *DECO PROTESTE*, 2021. https://www.deco.proteste.pt/casa-energia/eletricidade-gas/como-escolher (accessed Oct. 23, 2024).

[2] DECO PROTESTE, “Simulador eletricidade e gás: tarifa mais barata,” *DECO PROTESTE*, 2023. https://www.deco.proteste.pt/casa-energia/eletricidade-gas/simulador/resultados (accessed Oct. 23, 2024).

[3] POUPA ENERGIA, “Poupa Energia - Simulador Simples,” *Poupa Energia*, May 06, 2021. https://poupaenergia.pt/simulador-simples/ (accessed Oct. 23, 2024).