
**SCHOOL OF COMPUTER SCIENCES**

**ACADEMIC SESSION: 2023/2024**

**CSE241/CMM341 FOUNDATIONS OF SOFTWARE ENGINEERING**

**Software Engineering Project**

# Project Report 1

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**PREPARED BY: GROUP 14**

**Team name: ABC**

**SDG XX: SDG-7, "Affordable and Clean Energy**

**Project title: EcoPower connect**

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| MUHAMMAD ZAFRI BIN MOHD NIZAR | 159315 | Computer science | Software engineer |
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| Wang Hanfeng | 165405 | Computer science | Business analyst |

| | | | |
|---|---|---|---|
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# TABLE OF CONTENTS

# LIST OF TABLES



# LIST OF FIGURES

## 1. INTRODUCTION

### 1.1 Problem background

SDG-7, "Affordable and Clean Energy," is imperative as an estimate of over 800 million people lack access to reliable electricity, (Wikipedia, 2023https://en.wikipedia.org/wiki/Sustainable_Development_Goal_7). "Affordable and Clean Energy," the seventh Sustainable Development Goal (SDG-7) tackles a serious

worldwide energy dilemma. Over 800 million people are thought to live in a world without access to consistent electricity, which exacerbates poverty and reduces prospects for economic development and education. The majority of these areas without power are those that are either economically poor or rural.

In addition, the current level of energy output around the world has a major role in the destruction of the environment. Burning fossil fuels like coal, oil, and natural gas is the primary source of energy generation, accounting for around 60%(LITTLETON, Colorado, Nov 30 (Reuters) 2023 https://www.reuters.com/markets/commodities/fossil-fuels-still-dominate-global-power-systems-2023-11-30/ ), of the world's greenhouse gas emissions. Despite being the most widely used, these techniques seriously endanger the environment by causing habitat destruction, air pollution, and climate change.

Furthermore, Global warming and environmental degradation have emerged as two of the most challenging and definitive issues confronting all countries, it is observed that non-renewable energy utilization and $CO_2$ emission are associated inevitably(Journal of Cleaner Production. (2022) https://www.sciencedirect.com/science/article/abs/pii/S0959652621042323 ). Making the switch to renewable energy sources—like hydroelectric, solar, and wind power—is essential to achieving SDG-7 targets and environmental sustainability. Creating the infrastructure and technologies necessary to enable the production and delivery of inexpensive, clean energy is part of this shift. By accomplishing this, the

world's dependency on dangerous fuels might be greatly reduced, opening the way to a cleaner and sustainable energy future.

### 1.2 Organization or system environment background

The EnergyVanguard project is in the background of environmental pollution and lack of renewable energy, the purpose of the project is to solve environmental problems by the use of fossil fuels. With technological advancements and decreasing costs, the global demand for renewable resources is increasing. We are committed to funding this project, promoting the use of renewable resources, reducing carbon emissions, and creating a sustainable future.

The EnergyVanguard initiative is in line with the goals outlined in significant international agreements, like the Paris Agreement, which aims to fortify the global response to the threat of climate change (United Nations, 2015 https://www.un.org/climatechange/paris-agreement ), as part of the global reaction to climate change. In addition, the project will help fulfill Sustainable Development Goal 7 of the UN, which aims to provide everyone with modern, affordable, dependable, and sustainable energy (United Nations, 2023 https://www.un.org/sustainabledevelopment/energy/).
EnergyVanguard seeks to act as a catalyst for change in the energy industry by incorporating state-of-the-art renewable technologies and encouraging creative energy

solutions. Our strategy is to back projects that show measurable gains in energy efficiency and carbon footprint reduction.

## 1.3 System overview

The EcoPower connect system is a platform for users to discover and buy renewable resources. Our system, EcoPower connect,will offer a user-friendly web-based interface and mobile app with a good user experience. The system will inform users about nearby clean energy sources companies, which have a broader range of clean energy products and services, such as energy-efficient appliances and green building materials. After the purchase is made, It can track the customers purchase details, and energy efficiency.

### 1.3.1 System objectives

**Objective 1: Reduce Carbon Emissions Through Clean Energy:**

By shifting the focus to clean energy, the system directly contributes to a reduction in the carbon footprint of energy consumption. This has the potential to slow climate change, improve air quality, and reduce health risks associated with pollution. It also supports the transition to a sustainable energy economy.

**Objective 2: Provide Affordable Energy Services**

Making energy services more affordable can significantly impact the economic well-being of individuals and communities. Lower energy costs mean that households can allocate more of their budget to other essential needs, contributing to overall poverty reduction. Affordability also increases the accessibility of clean energy, encouraging more widespread adoption.

**Objective 3: Increase Awareness of Renewable Energy and Energy Efficiency**

Increased awareness leads to informed decision-making among consumers, which can drive the demand for renewable energy sources and products. Educating the public about the benefits of energy efficiency can result in behavior change that contributes to energy conservation and sustainability goals.

**Objective 4: Foster Community Engagement**

Engaged communities are more likely to come together to support clean energy initiatives, leading to stronger advocacy for environmental policies and shared responsibility in implementing sustainable practices. Community engagement can also stimulate local economies by promoting local clean energy businesses and creating jobs.

### 1.3.2 System module breakdown

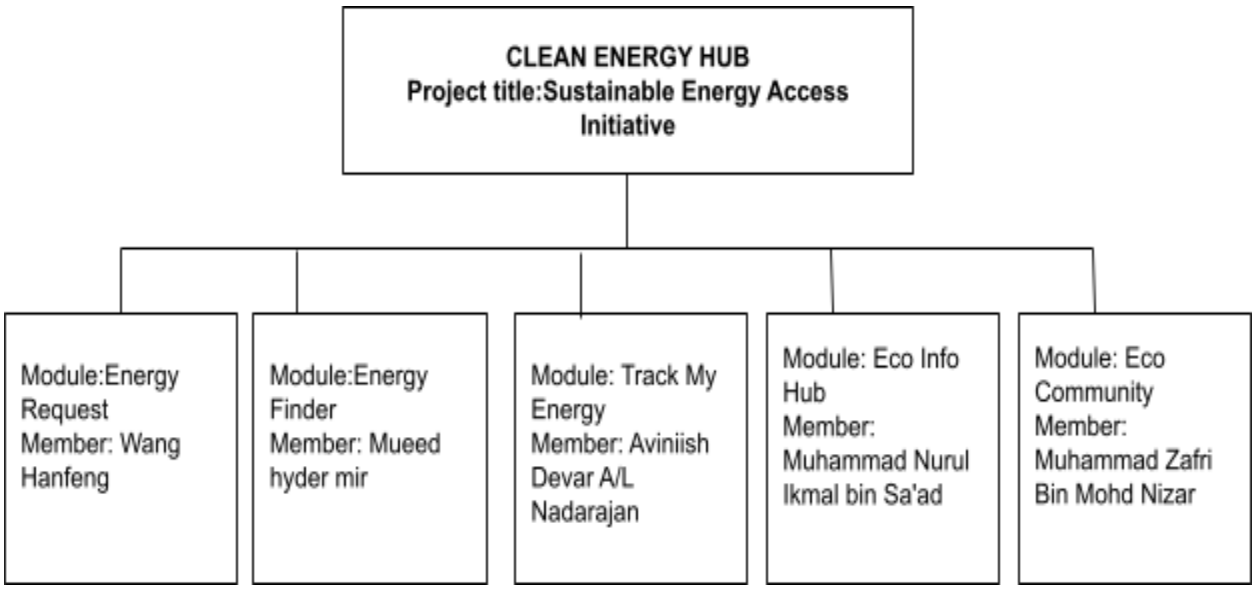


*Figure 1 - System Module*

| MODULE | MODULE NAME | DESCRIPTION |
|---|---|---|
| 1. | Energy Request | This makes a request on the system from the user for a new energy source. |

| | | |
|---|---|---|
| 2. | Energy Finder | Locates and displays nearby clean energy providers based on user location. |
| 3. | Track My Energy | Allows users to track the status of their clean energy service requests. |
| 4. | Eco Info Hub | Provides educational resources on renewable energy and sustainability. |
| 5. | Eco Community | A platform for community discussions and engagement on clean energy topics. |

*Table 1 - System Module*

**1.4 Project planning**

1.4.1 project team introduction


*Figure 2 - Group Photo*

## TeamEcoPower connect

| Members | Biography |
| --- | --- |
|  <br>**Mueed Hyder Mir** | My name is Mueed Hyder mir, and I am from India.I am quite enthusiastic about the things I cherish and one of them is surely “people” . With that said, I admire doing something that helps the people around me in one way or another, which directly or indirectly contributes to my ambition to become an entrepreneur.<br><br>As a project leader, I created a timeline to work on each section and guide my team members on every part of this project. I became the group representative to voice any queries about the project to the lecturer, and I hope we accomplish our project and each one of us can gain valuable knowledge and meaningful memories through this project. |

| | |
|---|---|
|  | My name is Muhammad Zafri Bin Mohd Nizar and I am from Malaysia. I am a very detailed software engineer because I always make sure my software works perfectly and also makes as few errors as possible. Moreover, most of my projects will always be completed on time.<br><br>In this project, my role as software engineer. I am tasked with handling the Software design and implementation which involve a lot of specific design and functionality which can be helped in making this project satisfy our client's needs when using it. |
|  <br>**Aviniish Devar A/L Nadarajan** | Hello! I'm Aviniish from Malaysia, a passionate Software Engineer dedicated to crafting innovative solutions. With a background in computer science, I am gaining years of experience in the software development landscape.<br><br>In my role as a Software Engineer, I've contributed significantly to my team by leveraging my expertise in software and networking, enabling us to streamline development processes and deliver robust software solutions. |
|  <br>**Muhammad Nurul Ikmal bin Sa'ad** | Hi, my name is Muhammad Nurul Ikmal bin Sa'ad. I am a student from the School of Management, USM. Despite that, I have a deep interest in the field of computer science. By taking this subject, I hope that I can gain lots of knowledge and experience in the field of software engineering.<br><br>In this project, I play the role of a Business Analyst. My contribution falls under the scope of providing details and insights in making decisions in order to make sure that EcoPower Connect system development satisfies the business requirements. |

| | |
|---|---|
|  <br>**Wang Hanfeng** | Hello, I'm Wang Hanfeng, and I am from China. I am very happy to work on a project with several of my colleagues. I really like the atmosphere in our team, which makes our project work well.<br><br>I'm the Business Analyst of EcoPower Connect, so I will do my best to help my team Gather detailed business requirements from existing documents or systems. In the meantime, I can Translate needs into detailed requirements that are clear, complete, consistent, and actionable for technical teams. |

### 1.4.2 Project team involvement

a) Communication Method

We will Mainly utilize whatsApp for quick informal discussions and reminders and webex to attend online meetings.

b) meeting attendance

Regular meetings will be scheduled weekly on Sundays at 10 AM. Attendance is mandatory for all scheduled meetings unless a team member notifies of their absence in advance. If a member cannot attend, they should inform the group at least 24 hours in advance and catch up by reviewing the meeting minutes.

c) Running meetings

Meetings will alternate between face-to-face and online formats, depending on availability and necessity. Face-to-face meetings will be held after each class . Online meetings will be conducted

via webex. The role of taking minutes/notes will rotate among team members for each meeting. Minutes of the meeting will be circulated via whatsApp within 24 hours of the meeting for everyone to review and add any additional comments.

d) division of project roles

| **Member name** | **Project role** |
|---|---|
| Mueed Hyder Mir | Leader |
| Muhammad Zafri Bin Mohd Nizar | Software Engineer |
| Aviniish Devar A/L Nadarajan | Software Engineer |
| Muhammad Nurul Ikmal bin Sa'ad | Business Analyst |
| Wang Hanfeng | Business Analyst |

*Table 2 - Project Roles*

e) Division of work

| **Module** | **Module name** | **person-in-charge** |
|---|---|---|
| 1. | Request Energy Access | Wang Hanfeng |
| 2. | Community Forum | Zafri |
| 3. | Energy Finder | Mueed |
| 4. | Track Energy Request | Aviniish |
| 5. | Informative Page | Ikmal |

*Table 3 - Work Division*

## 2 System Requirements

### 2.1 Functional requirements – User stories

**REQUEST ENERGY ACCESS MODULE**

| **TITLE:** Finding and Using clean energy products | **PRIORITY: MUST** |
|---|---|
| As a user, I need to find and use clean energy products | |
| **ACCEPTANCE CRITERIA:**<br>● Given that users realize the environmental impact of traditional energy sources, they want to use clean energy products.<br>● When they search for clean energy products.<br>● Then<br>○ they will see a variety of clean energy product options. | |

| **TITLE:** Upload Company Information | **PRIORITY: SHOULD** |
|---|---|
| As a clean energy company, we need to be able to create a profile on the EcoPower Connect platform to show our services to customers. | |
| **ACCEPTANCE CRITERIA:**<br>● Given a clean energy company has determined that EcoPower Connect is a suitable platform to reach more customers<br>● When they complete the registration process and upload their company information<br>● Then their profile will be recommended and shown to customers. | |

| **TITLE:** Resolving Clean Energy Product Issues | **PRIORITY: SHOULD** |
|---|---|
| As a user, I want to request after-sales service. | |
| **ACCEPTANCE CRITERIA:** | |

| |
|---|
| ● Given users have purchased a clean energy product via the EcoPower Connect platform.<br>● When there are some problems with clean energy products that are bought on the platform.<br>● Then I can connect promptly with customer service from the product's provider. |

| **TITLE:** Users discuss in the forum | **PRIORITY: MUST** |
|---|---|
| As a user, I want to discuss with other users in the forum about Energy efficient appliances | |
| **ACCEPTANCE CRITERIA:**<br><br>● Given a user who has experience with new energy sources<br>● When I wish to share my experiences, and insights about using these new energy sources<br>● Then go to a 'Community Discussions' or 'Knowledge Hub' section on the platform, and have the option to create a new discussion thread. | |

| **TITLE:** Register for an account | **PRIORITY: MUST** |
|---|---|
| As a user, I want to register for an account. | |
| **ACCEPTANCE CRITERIA:**<br><br>● Given an interested user of Ecopower Connect<br>● When they register for an account.<br>● Then these input requests that will be accessed by the system. | |

**LOCATE NEARBY ENERGY REQUEST MODULE**

| **TITLE:** Find Local Clean Energy | **PRIORITY:**Must |
|---|---|

| Providers | |
|---|---|
| As a user, I want to find nearby clean energy providers so that I can switch to a sustainable energy source for my home. | |
| **ACCEPTANCE CRITERIA:**<br><br>● Given I am logged into the system,<br>● When I select the option to locate nearby energy sources,<br>● Then<br>○ the system should display a list of clean energy providers within my selected radius along with their details. | |

| **TITLE:** Provider Detail Expansion | **PRIORITY:** Must |
|---|---|
| As a user evaluating options, I want to expand the details of a listed energy provider to learn about their specific clean energy sources, their contacts, and services offered. | |
| **ACCEPTANCE CRITERIA:**<br><br>● Given a list of energy providers,<br>● When I select one,<br>● Then<br>○ I should see expanded information | |

| **TITLE:** Direct Contact with Providers | **PRIORITY:** Must |
|---|---|
| As a user ready to transition to clean energy, I want to contact providers directly through the platform to inquire further or initiate service setup. | |
| **ACCEPTANCE CRITERIA:**<br><br>● Given I am viewing a provider's details,<br>● When I click on the contact option,<br>● Then<br>○ I should be able to send a message directly to the provider. | |

| **TITLE:**Map View of Energy Providers | **PRIORITY:** Should |
|---|---|
| As a user, I want to find nearby clean energy providers so that I can switch to a | |

| |
|---|
| sustainable energy source for my home. |
| **ACCEPTANCE CRITERIA:**<br><br>● Given I am logged into the system,<br>● When I select the option to locate nearby energy sources,<br>● Then<br>○ the system should display a list of clean energy providers within my selected radius along with their details. |

| | |
|---|---|
| **TITLE:** Energy Source Reviews and Ratings | **PRIORITY:** Should |
| As a potential clean energy customer, I want to read reviews and ratings for energy providers so that I can assess their reputation and service quality. | |
| **ACCEPTANCE CRITERIA:**<br><br>● GivenI am viewing the details of an energy provider,<br>● When I navigate to the reviews section,<br>● Then<br>○ I should be able to read existing customer reviews and see the provider's overall rating. | |

| | |
|---|---|
| **TITLE:** Save Favorite Energy Providers | **PRIORITY:** Should |
| As an environmentally conscious user, I want to save my favorite clean energy providers in my profile so that I can quickly access them later. | |
| **ACCEPTANCE CRITERIA:**<br><br>● Given I have found a desirable energy provider,<br>● When I click on a 'Save as Favorite' option,<br>● Then<br>○ the provider should be added to a favorites list in my user profile for easy future access. | |

| **TITLE:** Receive Notifications for New Providers | **PRIORITY:** Could |
|---|---|
| As a user interested in clean energy options, I want to receive notifications when new energy providers are added within my vicinity so that I can stay updated on the latest options available to me. | |
| **ACCEPTANCE CRITERIA:**<br><br>● Given I have opted in for notifications,<br>● When a new energy provider is registered in the system within my set distance preferences,<br>● Then<br>○ I should receive a notification alerting me to the new provider. | |

**<u>TRACK ENERGY REQUEST</u> MODULE**

| **TITLE:** Track Energy Location | **PRIORITY: 1** |
|---|---|
| As a user, I want to be able to track the energy efficiency of the products or services I've purchased, so that I can be aware of the location and when I will receive my products. | |
| **ACCEPTANCE CRITERIA:**<br><br>● Given that a user on EcoPower Connect with previous clean energy purchases,<br>● When user navigate to the "Energy Efficiency Tracking" section for a specific purchase,<br>● Then<br>○ They should see a map or information about the location and status of the purchased product or service delivery | |

| **TITLE:** Receive Notifications | **PRIORITY: 1** |
|---|---|
| As a user, I want to receive notifications or updates on the status of my recent clean energy purchase, so that I can stay informed about the progress of my order. | |

**ACCEPTANCE CRITERIA:**

- Given that a user with a confirmed clean energy purchase,
- When the purchase is confirmed,
- Then
    - They should receive notifications via preferred communication channel (e.g., email or mobile app) providing details about the confirmation, delivery status, estimated arrival time, or any delays.

| **TITLE:** View History | **PRIORITY: 2** |
|---|---|
| As a user, I want to be able to view a history of all my energy-related purchases, so that I can track my spending and make informed decisions about my energy consumption. | |

**ACCEPTANCE CRITERIA:**

- Given that a user with previous clean energy purchases,
- When user navigate to the "Purchase History" section,
- Then
    - They should see a list of all previous energy-related purchases, including the date of purchase, product or service bought, and the amount spent.

| **TITLE:** Provide Feedback | **PRIORITY: 3** |
|---|---|
| As a user, I want the ability to provide feedback or reviews for the clean energy products and services I've purchased, so that I can share my experience with other users. | |

**ACCEPTANCE CRITERIA:**

- Given that a user with previous clean energy purchases,
- When user navigate to the "Reviews" section for a specific product or service in purchase history,
- Then
    - They should have the ability to submit a review or feedback, including a rating and comments. Additionally, they should be able to view reviews from other users.

## ECO COMMUNITY MODULE

| **TITLE:** Edit forum | **PRIORITY: 1** |
|---|---|
| As a user, I want to edit forums. So that I can change the forum details if i made a mistake in the forum | |
| **ACCEPTANCE CRITERIA:**<br>● Given the user wants to edit forum<br>● When they press on edit information<br>● Then<br>○ The forum can be edited.<br>○ The forum will show an icon that it is edited. | |

| **TITLE:** View community forum | **PRIORITY: 1** |
|---|---|
| As a user, I want to view community forums. So that I can check on the forum created by the community | |
| **ACCEPTANCE CRITERIA:**<br>● Given the user want to view community forum<br>● When they scroll down.<br>● Then<br>○ They can view all the forum created by the communities. | |

| **TITLE:** View the overall amount of points | **PRIORITY: 2** |
|---|---|
| As a user, I want to view the overall amount of points. So that I can keep track of the points I obtained overall. | |
| **ACCEPTANCE CRITERIA:**<br>● Given the user wants to view the overall amount of points.<br>● When the user looks at the top right of the screen.<br>● Then<br>○ They may view the total amount of points accumulated. | |

| **TITLE:** Create a new forum | **PRIORITY: 1** |
|---|---|
| As a user, I want to create a new forum. So that I can give new information or discussion with other users. | |
| **ACCEPTANCE CRITERIA:**<br><br>● Given the user wants to create a new forum.<br>● When they press on the '+' .<br>● Then<br>○ New forum can be created and uploaded.<br>○ The user will be rewarded with points for each forum created. | |

| **TITLE:** Comment on the forum | **PRIORITY: 1** |
|---|---|
| As a user, I want to comment on the forum. So that I can ask the person posted the forum.. | |
| **ACCEPTANCE CRITERIA:**<br><br>● Given the user wants to comment on the forum.<br>● When they press the 'reply' button under the forum.<br>● Then<br>○ The user can add new comment. | |

| **TITLE:** View rewards available | **PRIORITY: 2** |
|---|---|
| As a user, I want to view rewards available. So that I can exchange the points I obtained with rewards. | |
| **ACCEPTANCE CRITERIA:**<br><br>● Given the user wants to view rewards available.<br>● When they press on the reward icon on top right screen.<br>● Then<br>○ They will be redirected to all available rewards. | |

**INFORMATIVE PAGE**

| **TITLE:** Quick start guide to use the software | **PRIORITY: 1** |
|---|---|
| As a user, I want to access a step-by-step guide on how the software works, so I can quickly start using it effectively. | |
| **ACCEPTANCE CRITERIA:**<br><br>● Given a new user has successfully registered,<br>● When they log in for the first time,<br>● Then a quick start guide page will automatically appear to assist them in navigating and using the software effectively. | |

| **TITLE:** Get information about the benefits of clean energy benefits and why everyone should start using them | **PRIORITY: 1** |
|---|---|
| As a user, I want to get information regarding the benefits of clean energy, so that I can understand how the clean energy can give impacts to the environment. | |
| **ACCEPTANCE CRITERIA:**<br><br>● Given a user already logged into the account,<br>● When user navigate to the "Learn More About Clean Energy" section,<br>● Then user can see clear information displaying the benefits of clean energy. | |

| **TITLE:** Get information about company background | **PRIORITY: 1** |
|---|---|
| As a user, I want to get information about the company background, so that I can understand its history, values, and mission, fostering trust and making informed decisions about engaging with its products or services. | |
| **ACCEPTANCE CRITERIA:**<br><br>● Given a user already logged into the account,<br>● When user navigate to the "About Us" section,<br>● Then user can see detailed information about the company's background, mission, and vision. | |

| **TITLE:** Get the information about the latest software updates | **PRIORITY: 2** |
|---|---|
| As a user, I want to access detailed information about each software update on the informative page, including release notes, bug fixes, and enhancements, so I can understand the impact and benefits of the update. | |
| **ACCEPTANCE CRITERIA:**<br><br>● Given the software has undergone an update,<br>● When the user logs into their account,<br>● Then a "What's New" icon will appear on their homepage, guiding them to discover and explore the latest features and improvements. | |

### 2.2 Functional requirements – Use cases

#### 2.2.1 Use case list

| Use Case ID | Use Case Name | Description |
|---|---|---|
| PROFILE001 | Edit forum | **Users** can edit the forum created by them. |
| PROFILE002 | View community forum | **Users** can view all the community forums created. |
| PROFILE003 | View the overall amount of points | **Users** can view the amounts of point obtained overall |
| PROFILE004 | Create new forum | **Users** can create new forums. |
| PROFILE005 | Comment on the forum | **Users** can add comment on the forum. |
| PROFILE005 | View rewards available | **Users** can view rewards available. |

*Table 4 - Use Case 1*

| Use Case ID | Use Case Name | Description |
|---|---|---|
| INFORM001 | Quick start guide to use the software | User can learn how to use the software |
| INFORM002 | Get information about the benefits of clean energy | User can get information about the importants of clean energy |
| INFORM003 | Get information about company background | User can understand about the company background |
| INFORM004 | Get the information about the latest software updates | User can stay updated with the latest improvements and changes of the software |

*Table 5- Use Case 2*

| Use Case ID | Use Case Name | Description |
|---|---|---|
| TRACK001 | Track Notifications | Users can track their energy request location. |
| TRACK002 | Receive Notifications | Users can receive notifications on location or status of requested energy. |
| TRACK003 | View History | Users can view the history of overall purchased energy. |
| TRACK004 | Provide Feedback | Users can choose to provide feedback about purchased energy to help other buyers. |

*Table 6 - Use Case 3*

| Use Case ID | Use Case Name | Description |
|---|---|---|
| REQUEST001 | Register for an account. | User must create an account before the request can be accessed by the system. |
| REQUEST002 | Access user's search request | User can get information of clean energy products. |

| | | |
|---|---|---|
| REQUEST003 | Access user’s customer service request | User can connect with customer service of companies. |
| REQUEST004 | Access user’s browse and upload | User can browse and discuss with other users |
| REQUEST005 | Access and review company information request | Company can show their products and services to customers. |

*Table 7 - Use Case 4*

| Use Case ID | Use Case Name | Description |
|---|---|---|
| LOCATE001 | Find clean energy | user can  search for clean energy providers based on specific criteria such as location or type of energy. |
| LOCATE002 | Login authentication | User have to login Before accessing personalized features.  This use case manages the verification of the user's credentials. |
| LOCATE003 | Direct Contact with Providers | Users can directly reach out to clean energy providers for inquiries or to initiate service setup. This use case manages the communication interface between the user and the provider |
| LOCATE004 | Map View of Energy Providers | Users can view the locations of clean energy providers on a map. This use case involves displaying a map with markers indicating the providers' locations. |
| LOCATE005 | Profile of Energy Providers | Users can view detailed profiles of energy providers, which include information like services offered, pricing, and contact details. This use case handles fetching and displaying this information. |
| LOCATE006 | Review | Users can leave reviews and ratings for energy providers they have interacted with or purchased from. |

| | | |
|---|---|---|
| LOCATE007 | Save Favorite Providers | Users can save the details of their favorite energy provides to make the process of finding the same provider easy |
| LOCATE008 | Provide Detail Expansion | users can get all the necessary information about a provider such as certifications, user testimonials, or more in-depth service descriptions |
| LOCATE009 | Receive notifications | Users can opt to receive updates or notifications about new energy providers |
| LOCATE0010 | New Providers | Users get the updates on the list of new providers whenever a new provider is added. |

*Table 8 - Use Case 5*

### 2.2.2 Use case diagram

**Request Energy Access Module**

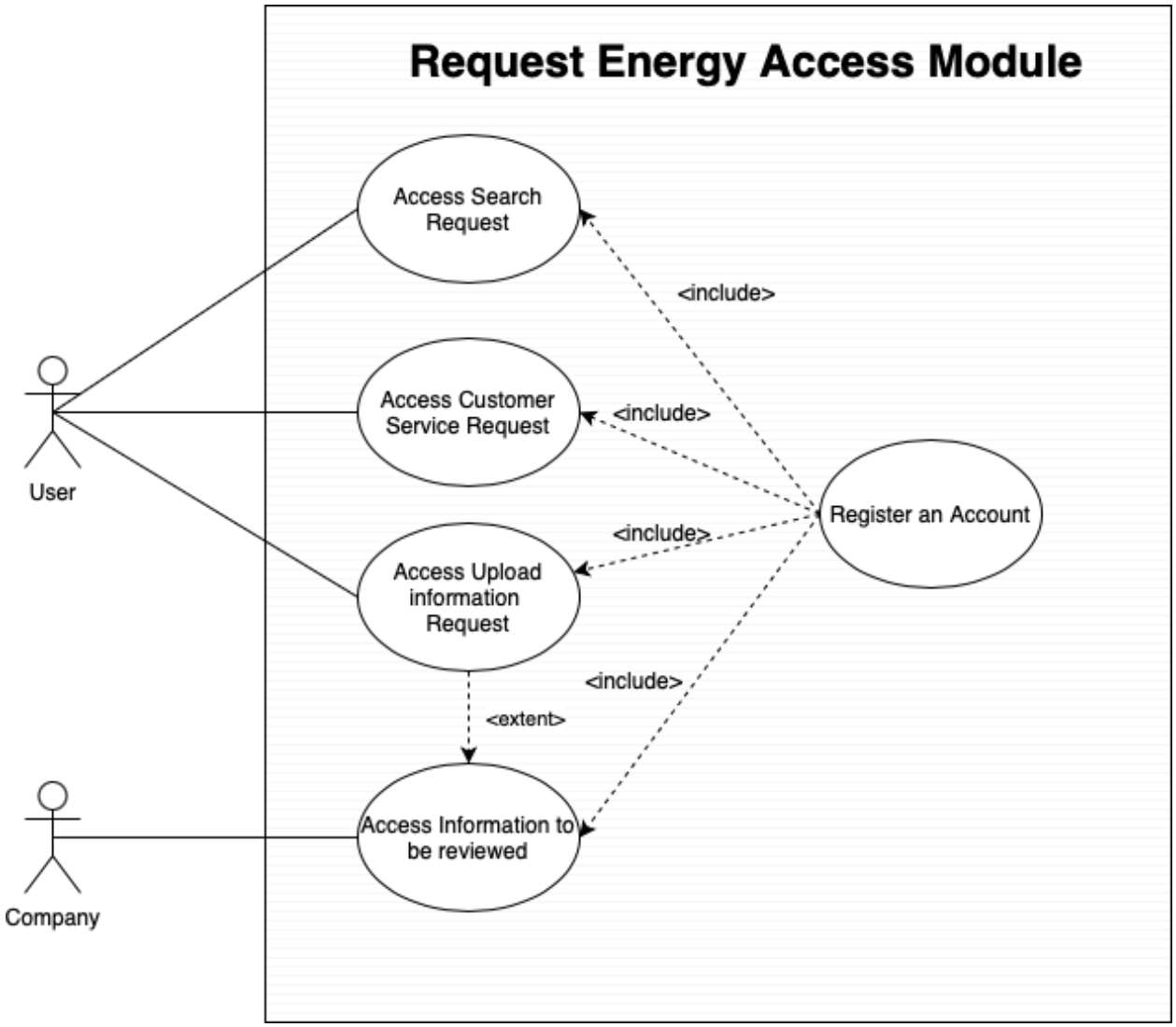


*Figure 3 - Use Case 1*

**Locate energy module**

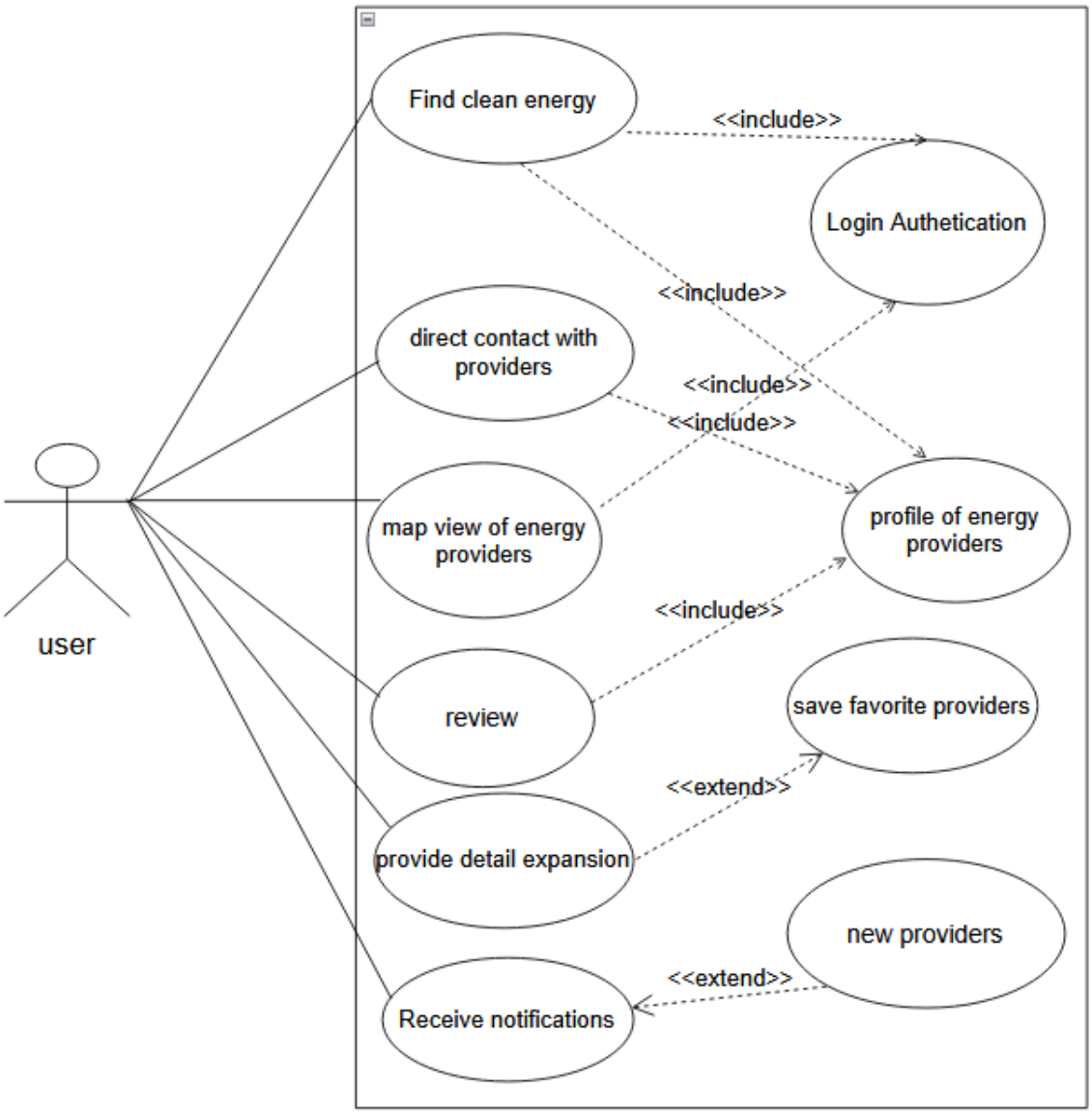


*Figure 4 - Use Case 2*

**Community Forum Module**

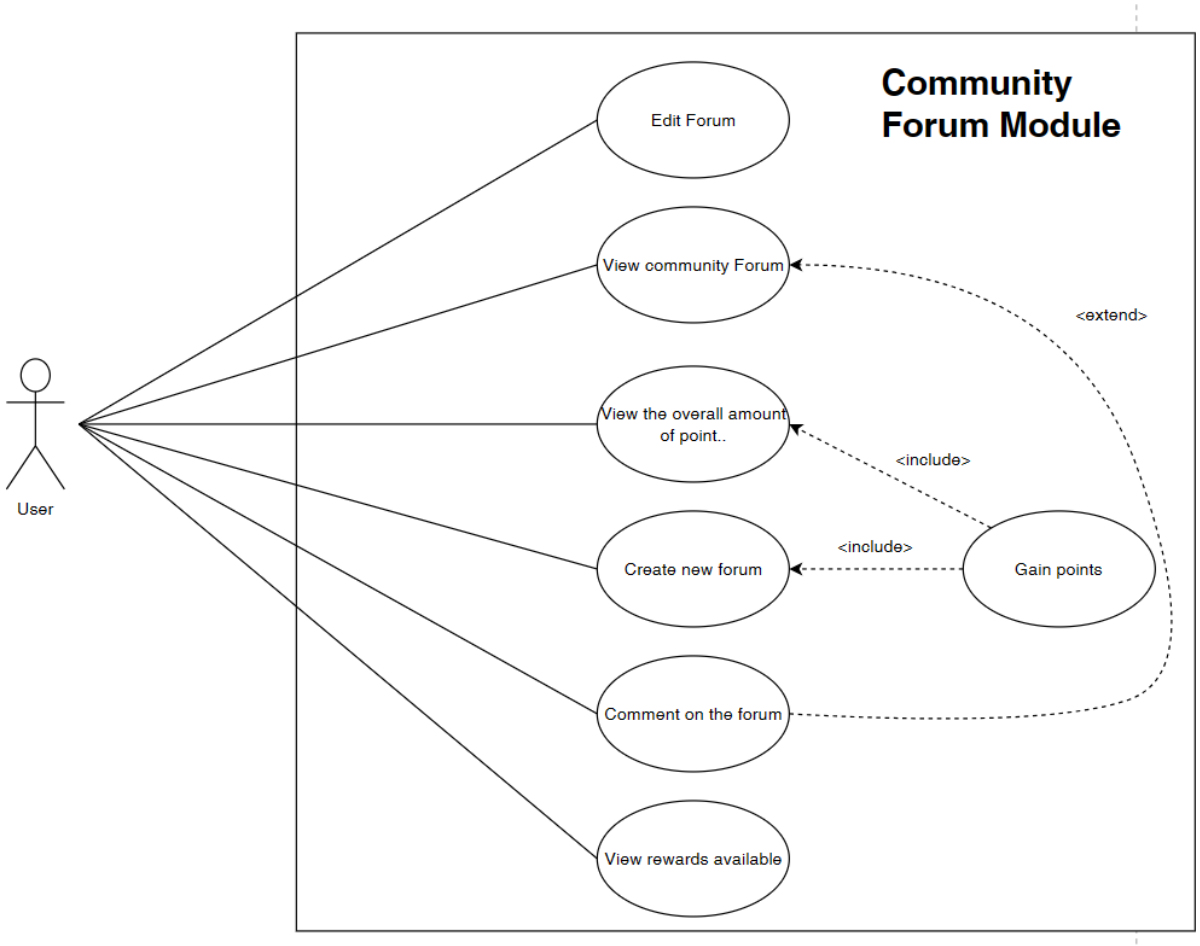


*Figure 5 - Use Case 3*

## Track Request

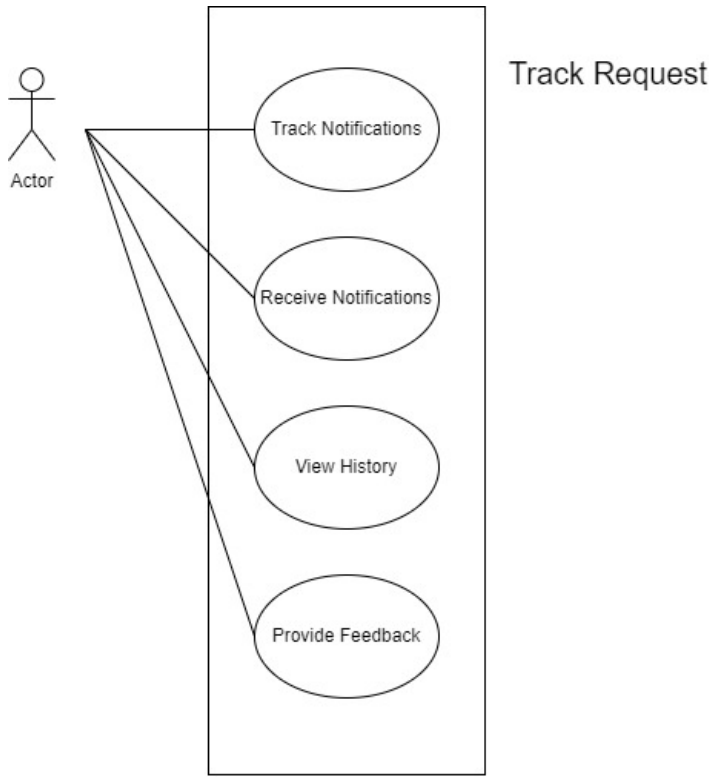


*Figure 6 - Use Case*

## Community Forum Module

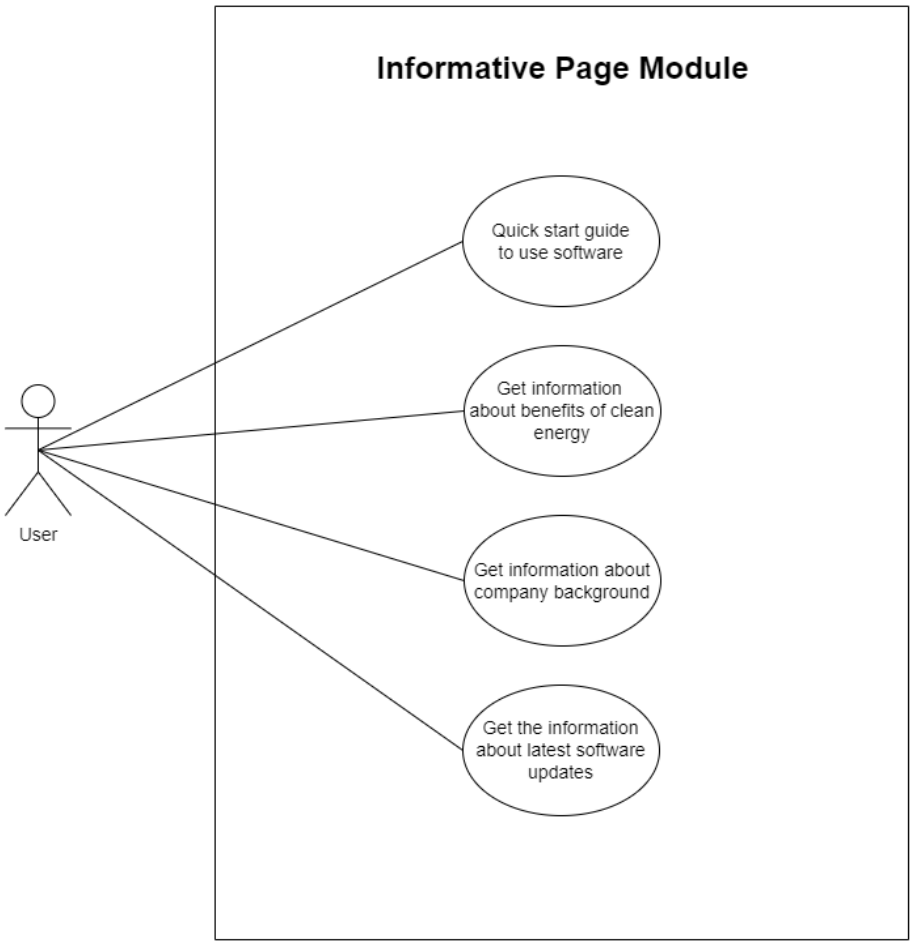


*Figure 7 - Use Case 5*

## 2.3 Non-functional requirements

1. **Usability**: The system should feature an intuitive and user-friendly interface, making it easily navigable for users of varying technical skills. The design should be accessible, with clear labeling and logical navigation paths. The average number of errors made by experienced users shall not exceed 3 per hour of system use.

2. **Performance**: The system must be capable of handling high user traffic and delivering information with minimal latency. It should ensure quick response times for searches and transactions. Pages on the system should load within 3 seconds, even during peak usage times.

3. **Security**: The system should employ industry-standard encryption for all user data transactions and store sensitive data securely.

4. **Maintainability**: The system shall be designed to allow for routine maintenance to be completed preferably during hours of least activity, not exceeding 2 hours per month.

5. **Scalability**: The system should be scalable to accommodate a growing number of users and an expanding database of energy providers. The system shall be capable of scaling to support up to a 100% increase in user load within a two-year period without degradation of performance standards.

6. **Availability**: The system shall be available for use 24/7, with maintenance windows

clearly communicated to users , scheduled during off-peak hours with a minimum of two weeks notice to users.

7. **Reliability**: The system must have high availability and minimal downtime. It should include error handling and recovery mechanisms to ensure continuous service and maintain user trust. The system shall have an uptime of 99.5% over a given month, excluding scheduled maintenance windows.

8. **Integrity**: The system shall perform automatic database backups every 24 hours to ensure no significant data loss in case of system failure.

# 3 System Architecture and Design

## 3.1 Architectural design

### 3.1.1 Conceptual view

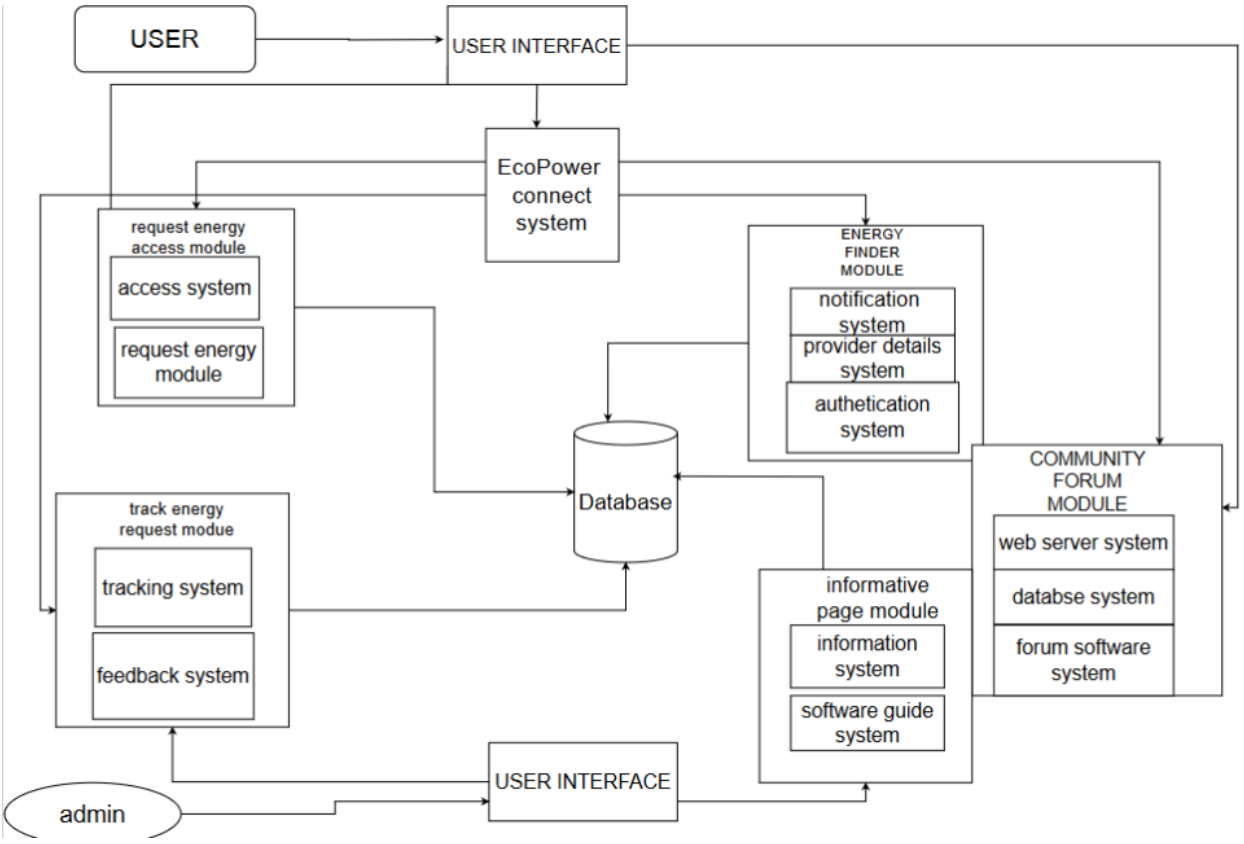


*Figure 8 - Conceptual View*

### 3.1.2 Process view

### Request Energy Access

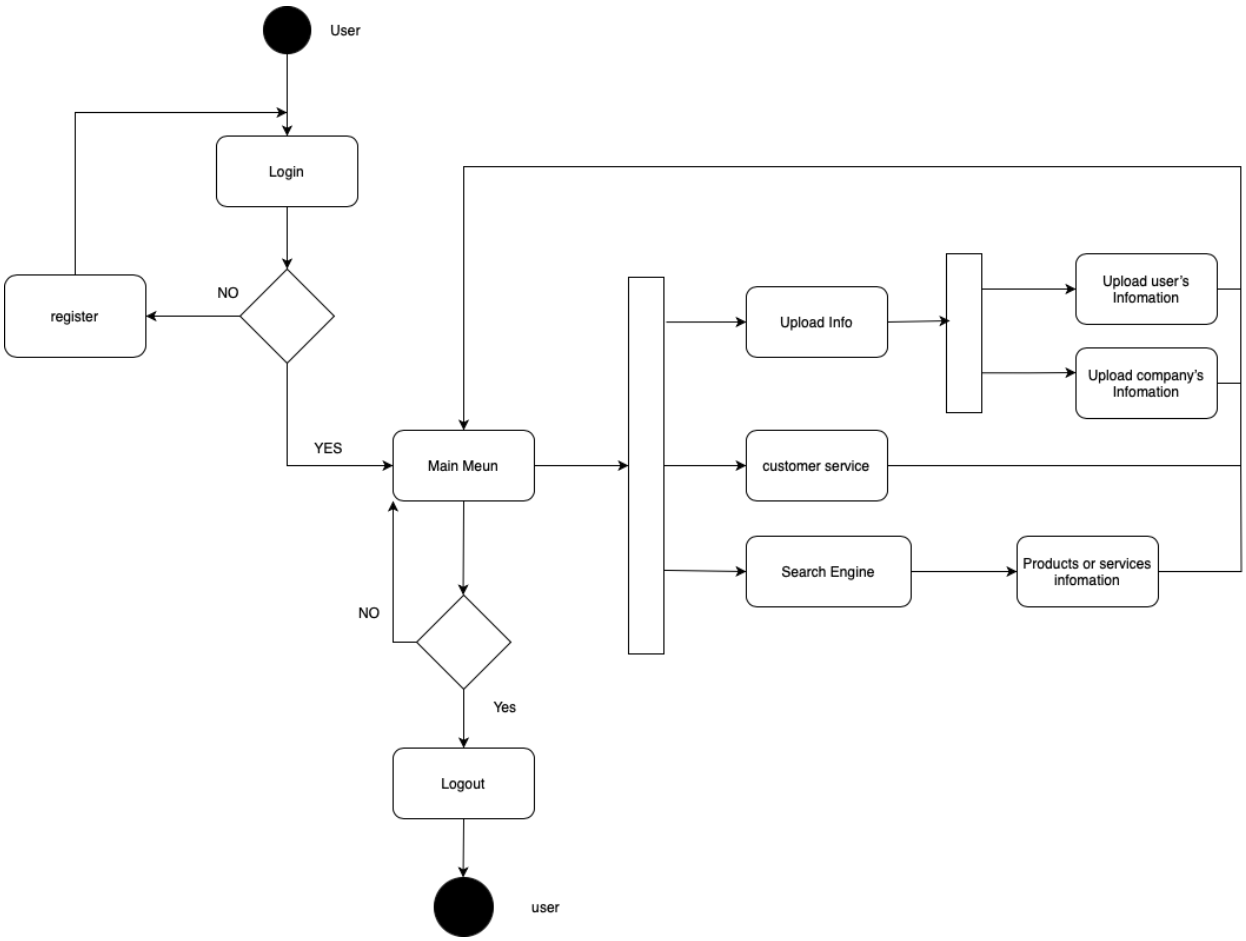


Figure 9: Process view 1

## Community Forum

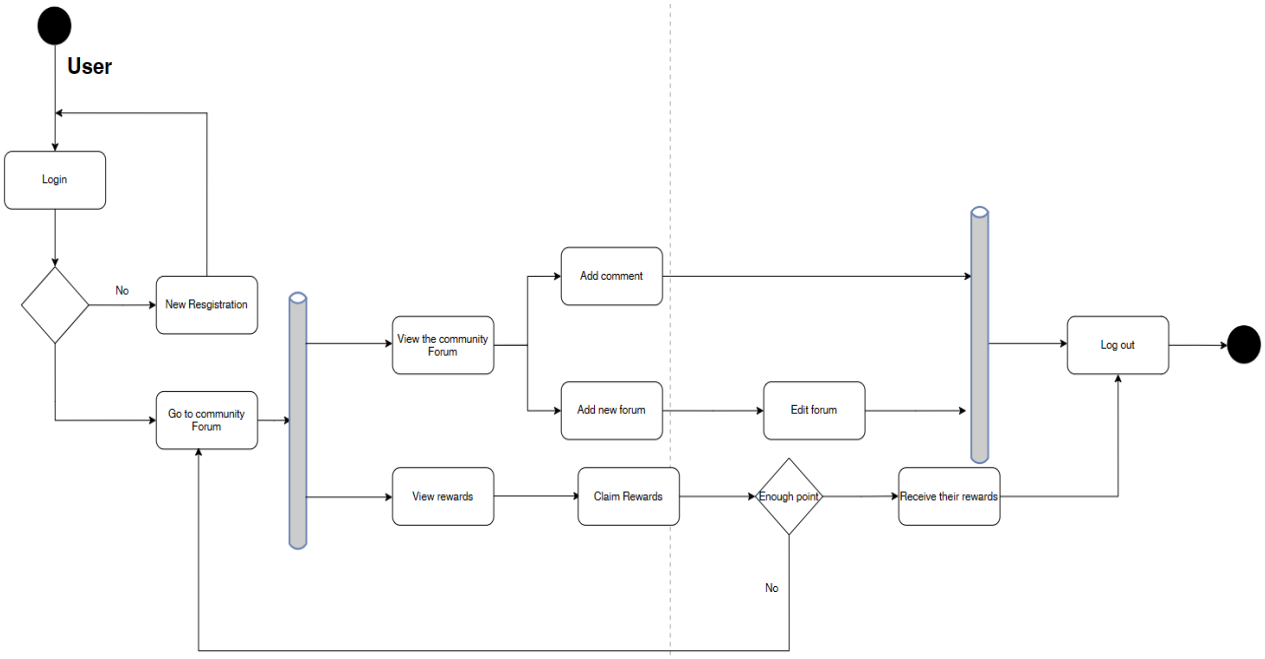


Figure 10: Process view 2

## 44Informative Page

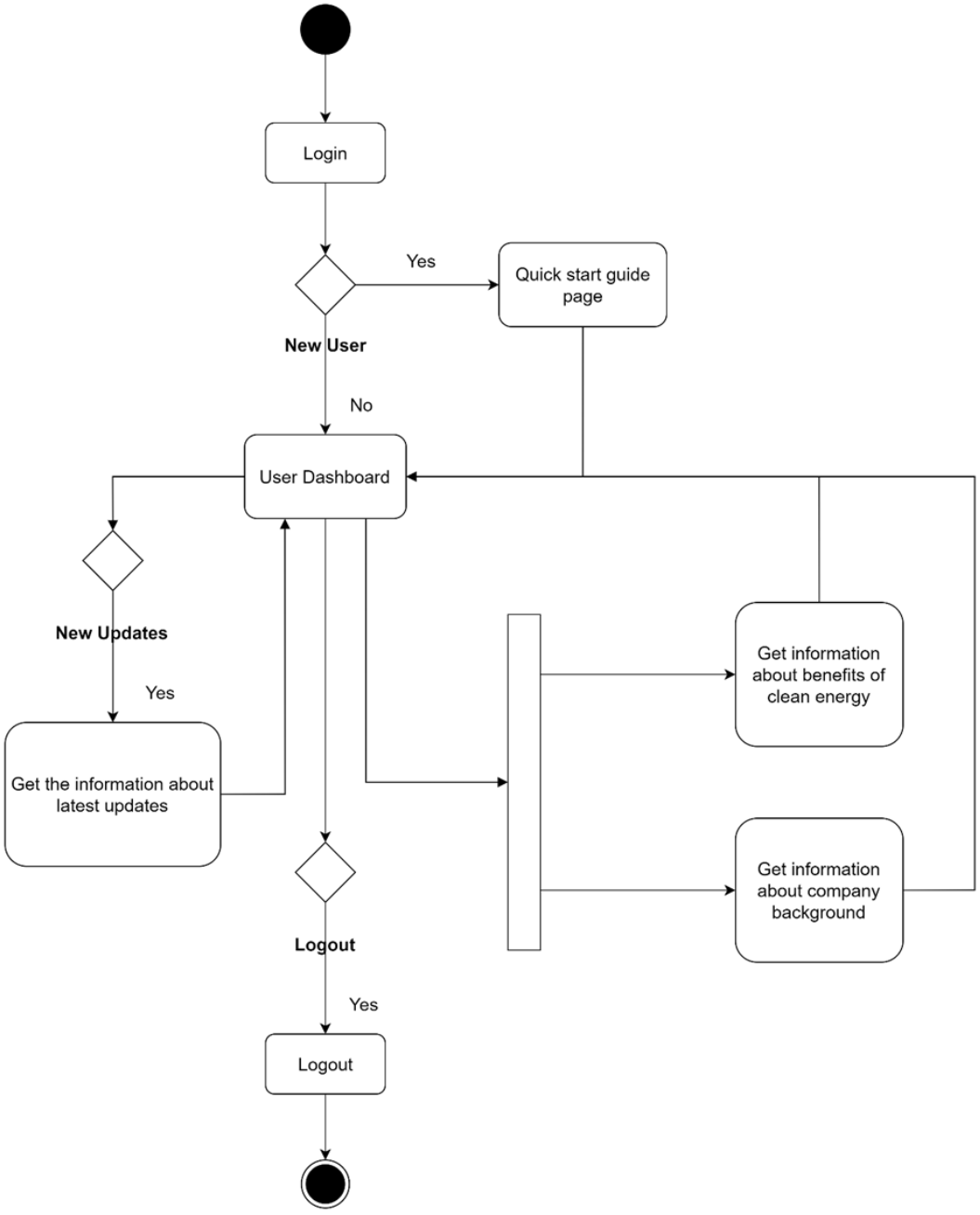


Figure 11: Process view 3

**Locate energy access**

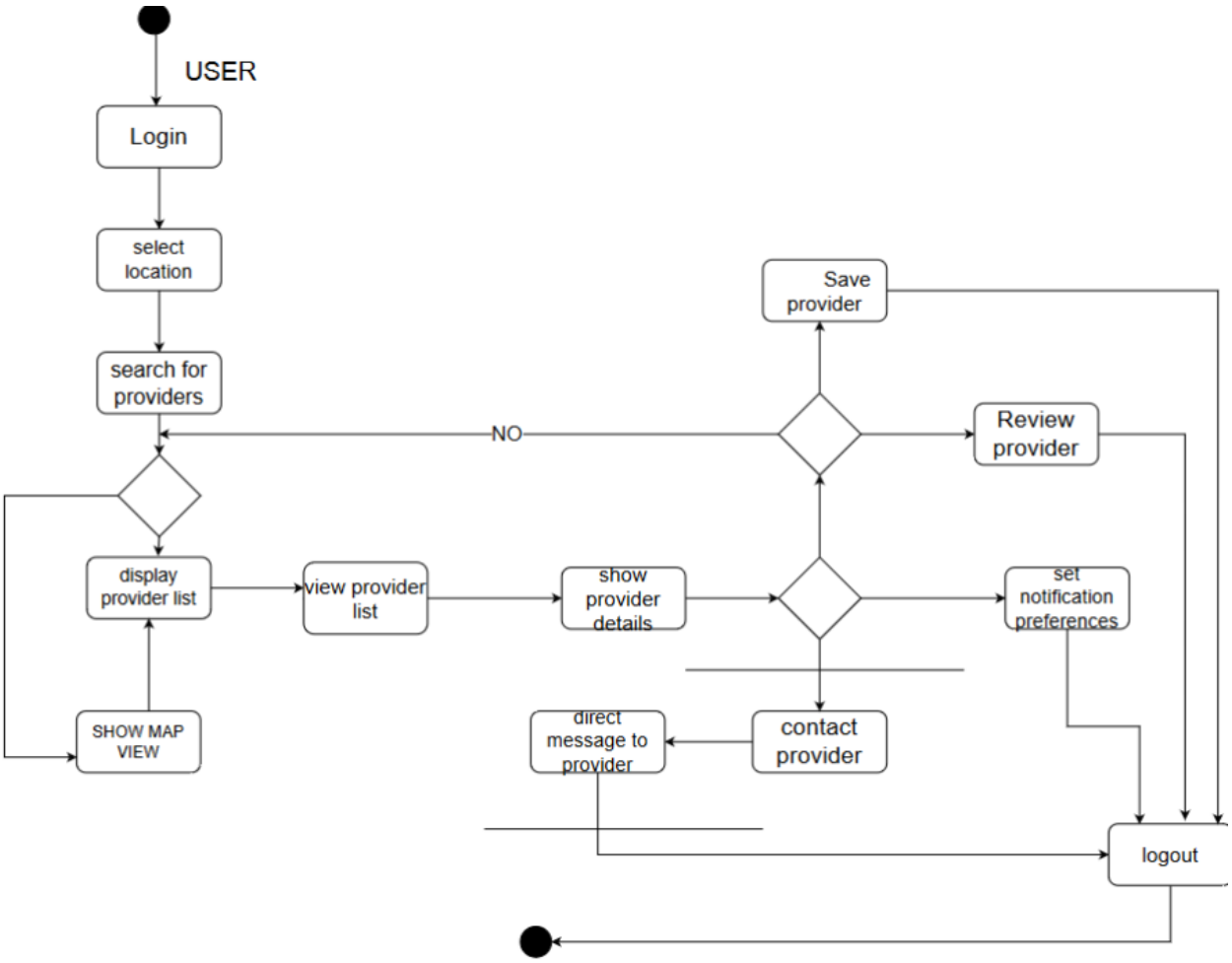


Figure 12: Process view 4

## Reference:


- Wikipedia, https://en.wikipedia.org/wiki/Sustainable_Development_Goal_7 ,2023

- LITTLETON, Colorado, Nov 30 (Reuters)

https://www.reuters.com/markets/commodities/fossil-fuels-still-dominate-global-power-systems-2023-11-30/

- (Journal of Cleaner ProductionVolume 333, 20 January 2022

https://www.sciencedirect.com/science/article/abs/pii/S0959652621042323 )

- (United Nations, 2015 https://www.un.org/climatechange/paris-agreement )

- (United Nations, n.d. https://www.un.org/sustainabledevelopment/energy/)