

EcoDecor

GreenIT - Website Project Report

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Date : 27/04/2025

Introduction

In the modern digital world, the environmental impact of websites is becoming an increasingly important concern. Traditional web development practices often lead to heavy, inefficient websites that consume excessive energy when accessed by users across the globe. In an effort to address this issue, we launched EcoDecor, a website dedicated not only to promoting ecological home furniture but also to applying green web development practices.

The goal of EcoDecor is twofold:

- Promote eco-friendly products by offering a catalogue of sustainable furniture.
- Implement best practices in web development to reduce the carbon footprint associated with website usage, focusing on performance optimization, energy efficiency, and user experience.

To minimize environmental impact, EcoDecor uses techniques such as lazy loading images and components, optimizing code, compressing assets, and hosting on efficient platforms like Vercel, followed by performance and eco-testing.

Features

EcoDecor offers different functionalities depending on the type of user. The system is designed around three user roles: viewer, logged-in user, and admin.

Viewer (Unregistered User)

- A viewer can browse the catalogue of eco-friendly furniture.
- However, they cannot add items to the cart until they register and log in.
- This encourages active participation and reduces unnecessary server load from anonymous interactions.

Logged-in User

After registration and successful login, a user can:

- Add products to the shopping cart.
- Browse personalized content.
- This separation ensures that server resources are more efficiently used, as only authenticated users can initiate purchase-related actions.

Admin

The admin has elevated privileges and access to administrative tools:

Product Management Page:

- Add new products.
- Edit existing product details (e.g., description, price, stock).
- Delete products no longer available.

User Management Page:

- View all registered users.
- Block or unblock users if necessary (e.g., for inappropriate behavior).
- Admin activities ensure that the catalogue stays up-to-date and the community remains respectful and secure.

Minimization of environmental impact

EcoDecor incorporates several measures to reduce its environmental footprint:

- Image Lazy Loading: Images are loaded only when they are about to enter the user's viewport.
- Component Lazy Loading: Vue components are loaded dynamically, minimizing initial load time.
- Asset Compression: Images are compressed (e.g., WebP format), and unused CSS/JS are removed.
- Optimized Hosting: Deployed on Vercel, a carbon-conscious platform powered by renewable energy.
- Code Optimization: Minimized and cleaned code, efficient API calls, reduced bundle sizes.

These practices contribute to faster loading, lower energy usage per page view, and an overall more sustainable website.

Technical choices and Carbon Footprint

Frontend: Developed using Vue.js with dynamic import for lazy loading and optimized routes.

Backend: Developed with Node.js using Express.js and connected to a MySQL database hosted via MySQL Workbench server.

Authentication: Implemented using JWT (JSON Web Tokens) to secure user sessions.

Hosting: Vercel platform, known for green hosting.

Carbon Footprint Analysis: Tools like Website Carbon Calculator and EcoGrader were used to measure the estimated CO₂ emissions per page view.

Initial testing indicated a lighter environmental impact compared to standard websites of similar complexity.

Code architecture

The project is divided into two major parts:

Frontend (Vue.js)

Pages: Home, Beds, Furniture, Decoration, Storage, Cart, Individual Product, Register, Login, Product Management, User Management.

Routing: Lazy-loaded routes with Vue Router.

State Management: Local storage and props for cart and session management.

Image Lazy Loading: Native and library-based (vue3-lazyload).

Backend (Node.js)

Authentication: Login and registration system secured with JWT.

APIs: CRUD operations for users and products.

Authorization: Role-based access control (user/admin distinction).

Database

Database are usually the part consuming a lot of space in a server, that why we made our database as optimized as possible :

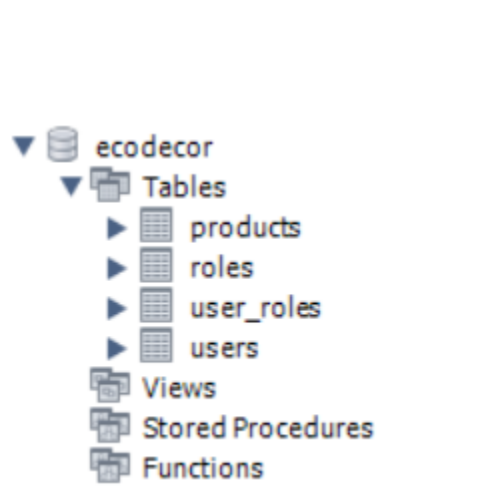
	Table: products Columns: id int AI PK product_name varchar(255) description varchar(255) img varchar(255) quantity_available int price float quantity_cart int category varchar(255) ratings json createdAt datetime updatedAt datetime
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Table: roles Columns: id int AI PK name varchar(255) createdAt datetime updatedAt datetime
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Table: user_roles Columns: createdAt datetime updatedAt datetime <u>roleId</u> int PK <u>userId</u> int PK

Table: users Columns: id int AI PK username varchar(255) email varchar(255) password varchar(255) blocked tinyint(1) createdAt datetime updatedAt datetime

Web development and Eco-responsibility

As digital technologies grow, so does their environmental impact. Eco Responsive web development focuses on building websites that are not only user-friendly but also energy-efficient. This involves optimizing images, minimizing code, reducing server requests, and designing for low power consumption—especially on mobile devices. By prioritizing simplicity, performance, and accessibility, developers can reduce data transfer and energy use, leading to lower carbon emissions. Adopting eco responsive practices is not just a technical choice, but a commitment to sustainability in an increasingly connected world.

Functionality and carbon footprint

- Viewer Mode reduces unnecessary backend interactions by limiting access.
- Lazy Loading greatly reduces initial page load emissions.
- Minimal Third-Party Dependencies means fewer external requests.
- Database Query Optimization ensures less server energy is wasted.

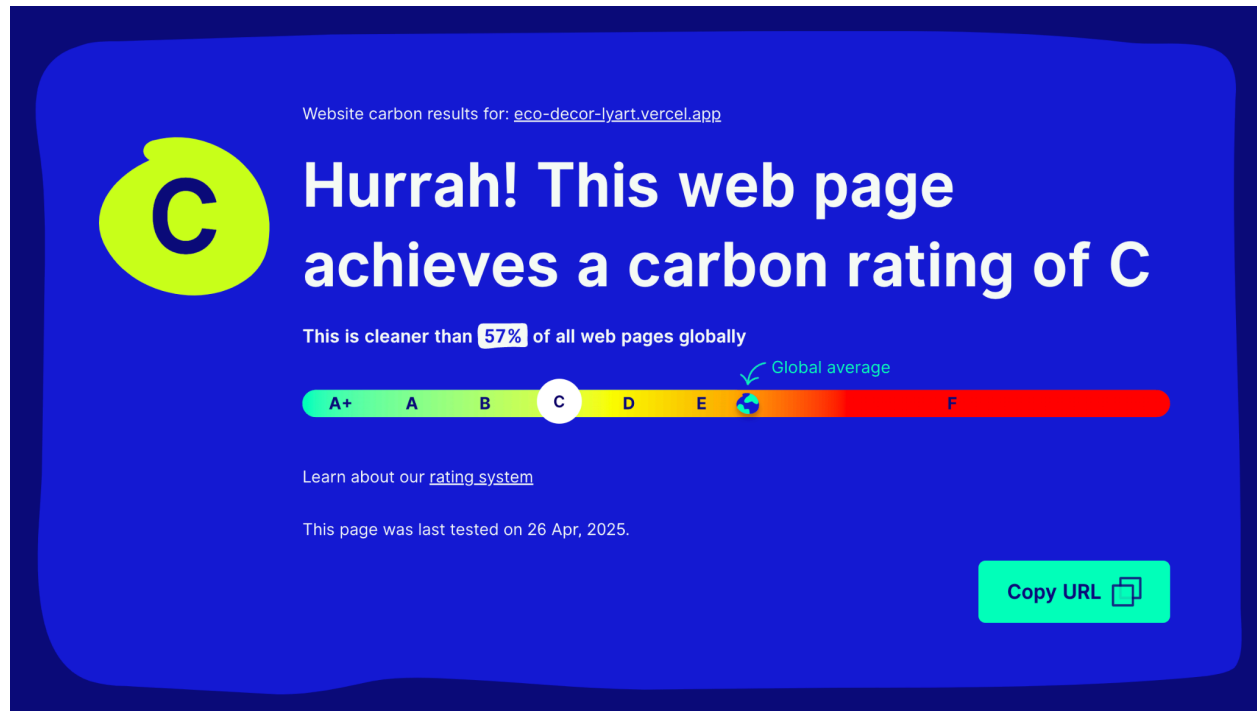
To reach a good balance between features and carbon footprint we decided to minimize the features developed to only have the essential making the website lighter. The use of the database was also thoughtfully designed to avoid always having the full database in memory. The picture display was also designed specifically to prevent too much memory consumption with a lazy display when possible and not a high quality display.

Potential improvement & ecological principles for future projects

Future web projects can benefit greatly from a stronger integration of ecological principles. This includes choosing green hosting providers powered by renewable energy, implementing lazy loading to reduce unnecessary data transfers, and favoring

lightweight design frameworks. Developers can also improve performance by minimizing dependencies and prioritizing static content when possible. Beyond technical aspects, raising awareness among users about the environmental impact of digital tools can foster more responsible usage. By making sustainability a core design objective from the start, future projects can contribute meaningfully to reducing the web's ecological footprint.

Carbon Footprint Analysis



Analysing our website's carbon footprint with the online Website Carbon Calculator (<https://www.websitecarbon.com/website/eco-decor-lyart-vercel-app/>), we find that it achieves a carbon rating of C, which is cleaner than 57% of all web pages globally.

0.41g of CO₂ is produced every time someone visits the webpage.