AI Usage Report: Carbon Footprint Calculator

Project Name: Carbon Footprint Calculator & Tracker

1. AI Tools Used in Development

1.1 GitHub Copilot (Development Assistant)

Purpose: Code generation, development assistance

Usage Areas:

- Code Generation: Assisted in writing boilerplate code for React components, Express routes, and MongoDB schemas
- Debugging: Helped identify and fix bugs in authentication flow, API endpoints, and state management
- Code Refactoring: Suggested improvements for code organization and best practices

1.2 Claude (Architecture)

Purpose: Technical consultation and architectural decisions

Usage Areas:

- Discussed database schema design for User and Activity models
- Researched carbon emission calculation
- Explored different charting library options (chose Recharts)

2. AI Integration in the Application

2.1 Google Gemini AI (Core Feature)

Purpose: Provide intelligent, personalized carbon reduction recommendations to users

Implementation Details:

- API: Google Generative AI (@google/generative-ai v0.24.1)
- Model: Gemini-1.5-flash
- Integration: Backend service (services/aiService.js)

Features Powered by Gemini:

A. Personalized Recommendations System

Input: User's activity history, emission statistics, and category breakdowns

Processing: Gemini analyzes patterns and generates context-aware suggestions

Output: 5-7 actionable recommendations with specific impact estimates

Example: "Based on your 45 kg CO_2 from car travel, consider carpooling 2-3 days/week to reduce emissions by ~30%"

B. Interactive AI Chatbot

Functionality: Real-time Q&A about carbon footprint and sustainability

Context: Receives user's emission data for personalized responses

Use Cases:

- Answering questions about specific activities' impact
- Explaining emission calculations
- Providing additional reduction strategies
- General sustainability education