Mr. Nik
Building Owner

Problem Statement

Buildings and infrastructure are responsible for a significant portion of energy consumption worldwide. Their lack of inefficiency leads to unnecessary energy waste and increased carbon emissions. Integrating renewable energy sources effectively into these systems remains a significant challenge. Monitoring energy consumption accurately is

Greener Building =

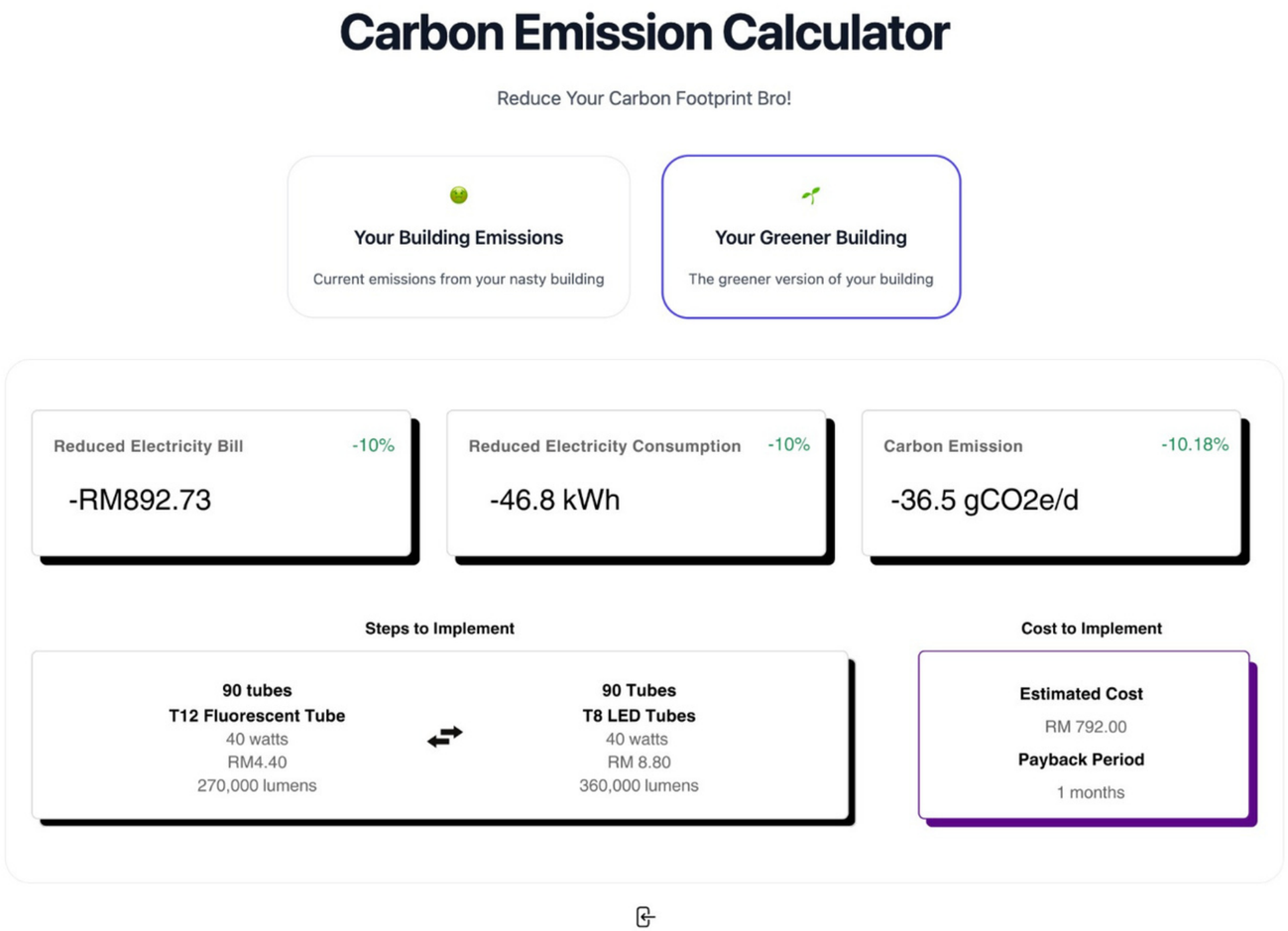
Carbon Emission ↓

α

Electricity Consumption ↓

- Li, M., Michael Yao-Ping Peng, Nazar, R., Bosede Ngozi Adeleye, Meng, S., & Muhammad Waqas. (2022). How Does Energy Efficiency Mitigate Carbon Emissions Without Reducing Economic Growth in Post COVID-19 Era. Frontiers in Energy Research, 10. https://doi.org/10.3389/fenrg.2022.832189
- Jaruwan Chontanawat. (2020). Relationship between energy consumption, CO2 emission and economic growth in ASEAN: Cointegration and causality model. Energy Reports, 6, 660–665. https://doi.org/10.1016/j.egyr.2019.09.046
- (PDF) Carbon Emissions due to Electricity Consumption in the Residential Sector. (2023). ResearchGate; ResearchGate. https://www.researchgate.net/publication/257143751_Carbon_Emissions_due_to_Electricity_Consumption_in_the_Residential_Sector

Result



✔ Detailed **ROI Analysis** for Transitioning to **Greener Building** Based on **Chosen** Green Practices

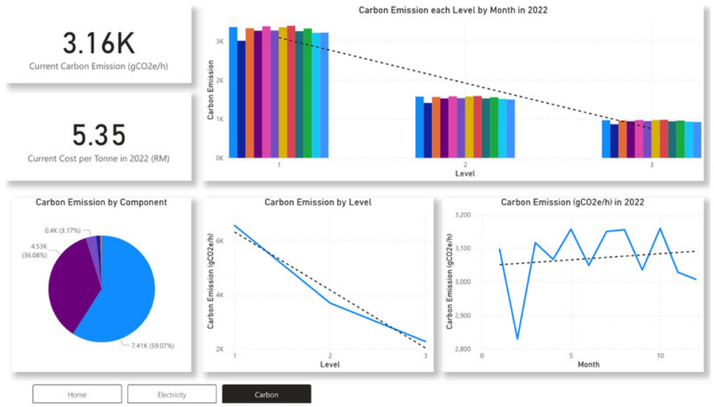
EcoSolve

Eco-friendly Calculator Integrated Into Advanced Infrastructure Monitoring System for Sustainable Decision Making

by **CodeRush**

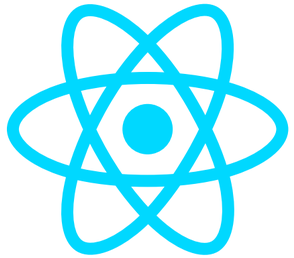
DellDigital Hack2Hire

Solution



- **Monitor, compare** and **forecast** energy consumption, electricity bill and carbon emission by component, level and month
- Facilitate **data anomalies discovery** to detect energy waste
- Provide **data-centralized dashboard inter-connected** with eco-friendly calculator
- **Recommend green practices** to transition existing infrastructure into a greener version
- Provide **Return on Investment (ROI) Analysis** to implement the transitioning

Tech Stack



React.js

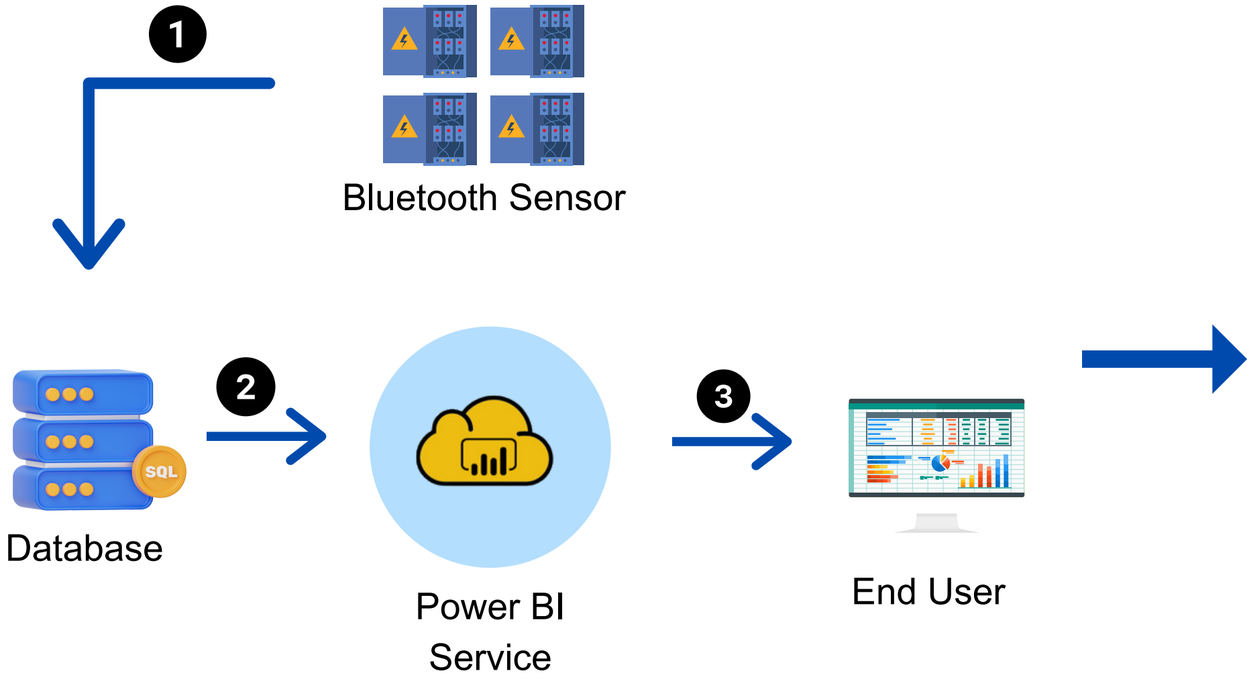
Vite

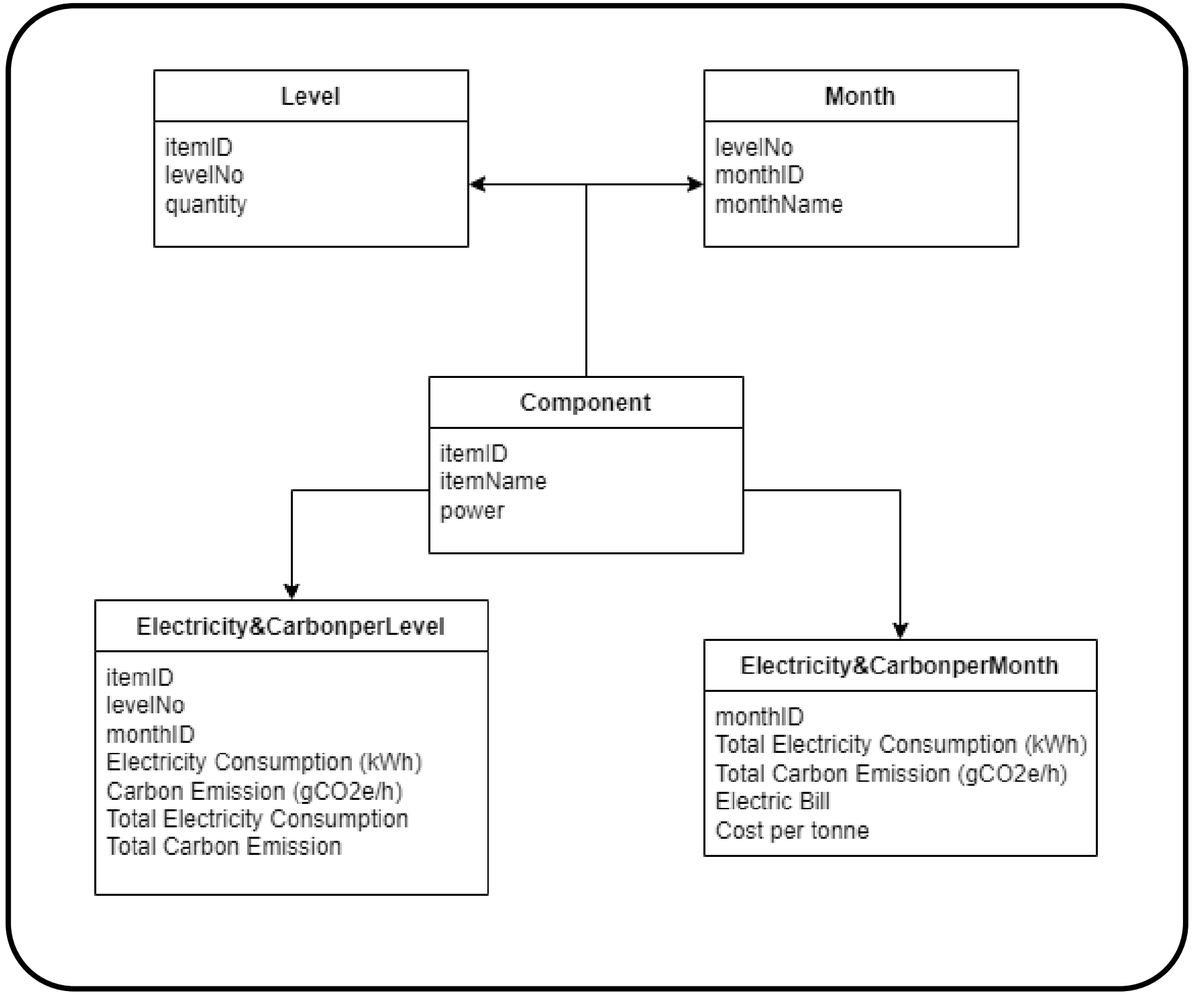
Tailwind CSS

Node.js

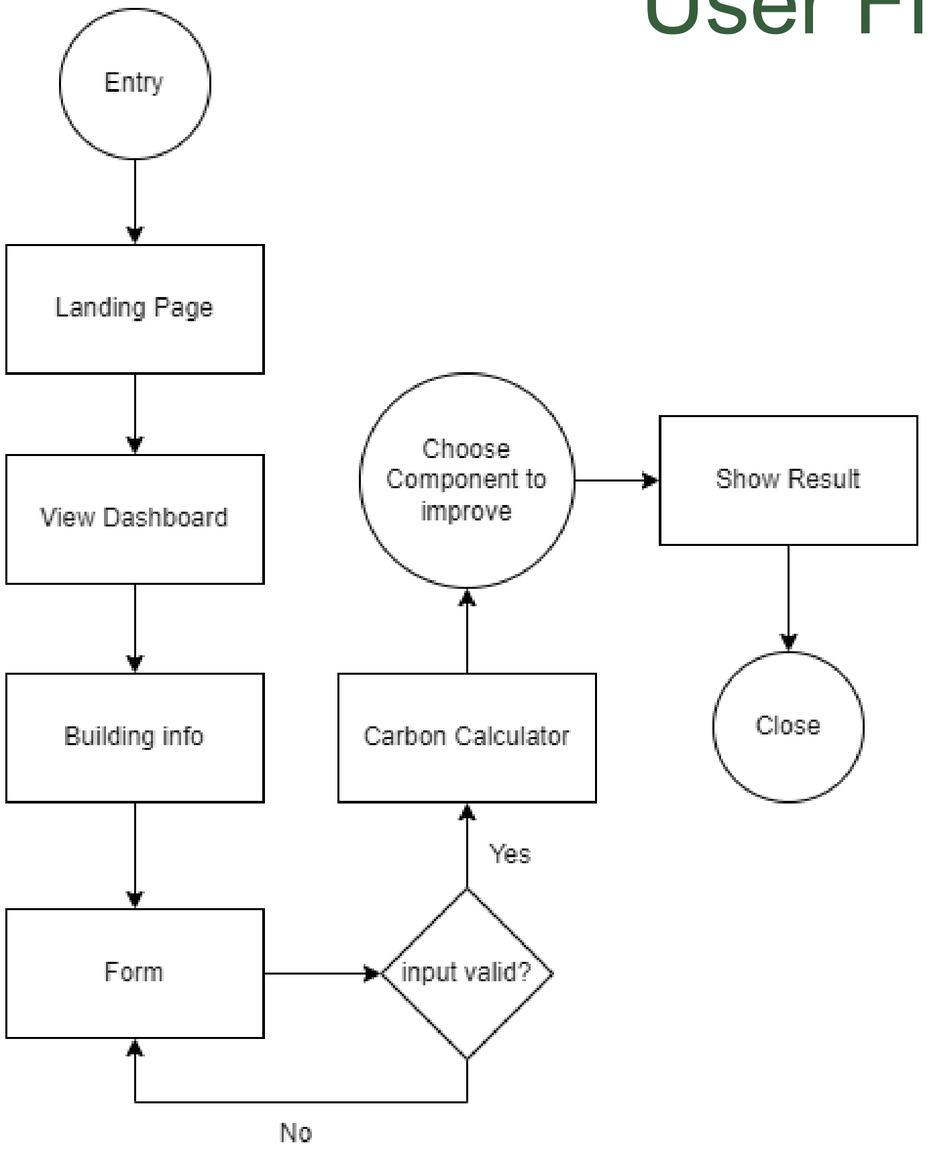
Power BI

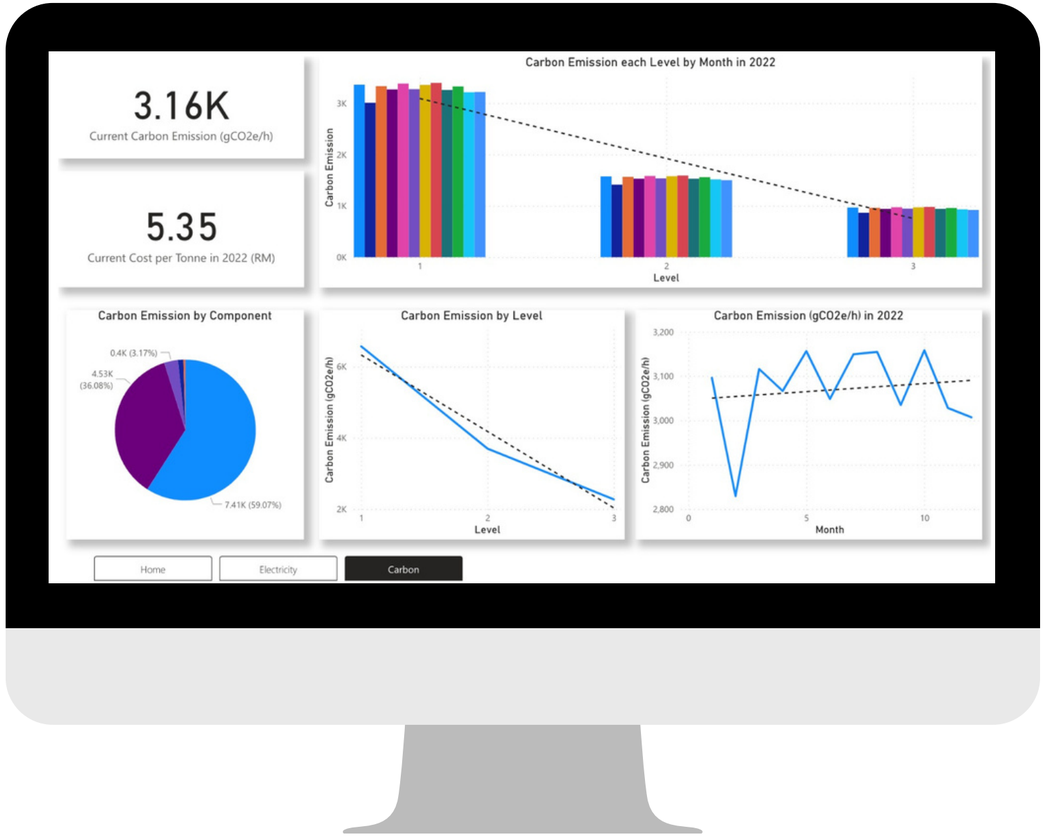
Real-time Architecture





User Flow Diagram





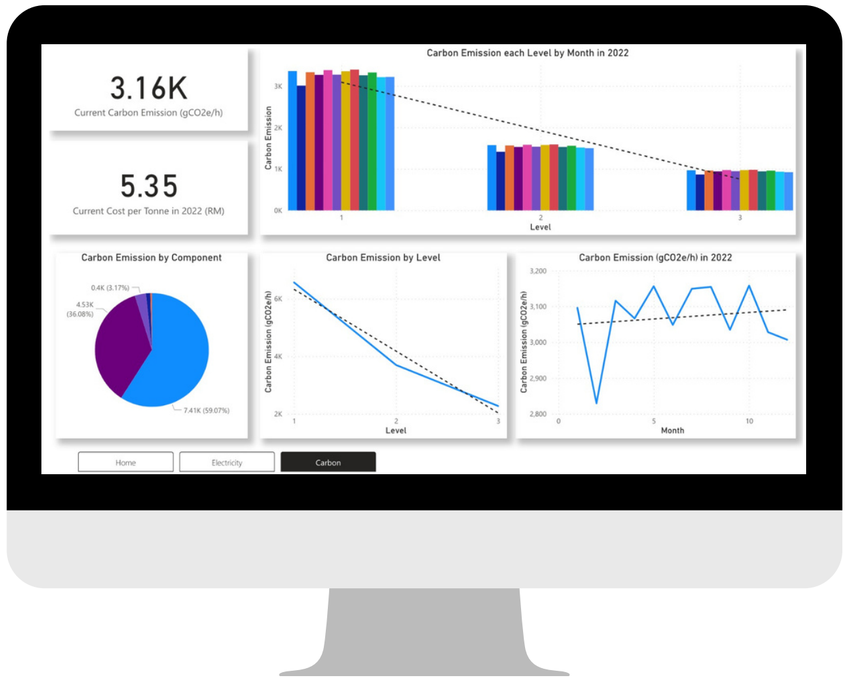
Demonstration

EcoSolve

by CodeRush

DellDigital Hack2Hire

DIGITAL TWINNING CONCEPT



Power Distribution Box in Each Level

Looking ahead: Our Future Plan

What‘s more?

- Monitor more than building component and for more than one building
- Smart IoT sensor implementation to detect movement
- Easy to implement in pre-existing building
- Use python as primary language and implement python framework such as Scikit-Learn for data visualisation
- Store and fetch real-time data by using cloud services such as AWS Amazon

Our Brilliant Team

Julia Nurfadhilah
Team Leader

Noor Syahirah
Power BI Visualisation

Nik Syahmi
Full-Stack Developer

Ahmad Rusyaidi
Full-Stack Developer

DellDigital Hack2Hire

Appendix

FLUORESCENT TUBE TO LED TUBE CONVERSION CALCULATION

Fluorescent Tube:
Wattage: 40 watts
Lumen Output: 3000 lumens

Total Lumens = Standard Lumen Output per Tube × Number of Tubes
Total Lumens = 3000 lumens × 90 tubes = 270,000 lumens

LED Tubes:
Wattage: 40 Watt
Lumen Output: 100 lumen/watt

Total Lumens = Lumens per Watt × LED Wattage × Number of Tubes
Total Lumens = 100 lumens/watt × 40 watts × 90 tubes = 360,000 lumens

Appendix

The Sustainable Development Goals (SDGs) include:

Affordable and Clean Energy (SDG 7): By promoting energy-efficient solutions, your calculator contributes to ensuring access to affordable, reliable, sustainable, and modern energy for all.

Climate Action (SDG 13): Addressing climate change by providing a tool that encourages sustainable practices and reduces energy consumption.

Responsible Consumption and Production (SDG 12): Promoting sustainable consumption patterns by helping users make eco-friendly choices in energy usage.

Quality Education (SDG 4): Educating users on the environmental impact of their choices through the calculator.

Industry, Innovation, and Infrastructure (SDG 9): Encouraging innovation in the industry by supporting the use of sustainable technologies and practices.

Appendix

- carbon emission (kWh * CEF), CEF from 2019 data
- electricity consumption (kW * time(h) * quantity)
- eletric bills ((max power demand in 30 days for commercial used)=100 * 30.3 + (kWh * 36.5 / 100) + (kWh * tax(0.17%)))