SATNAC

MAPPING VIABLE DEPLOYMENT AND CHARGING INFRASTRUCTURE NEEDS

HOW OUR SOLUTION WORKS

BY

SYNERGY TEAM GROUP REPORT

Introduction

This report gives details on how our solution for the deployment of Battery Electric Vehicles and the installation of charging infrastructure, the Openserver EV Deployment and Charging Viability Model, an AI-powered geospatial decision support tool has been created.

How Our Solution Works

To determine the best locations in South Africa for the deployment of Battery Electric Vehicles (BEVs) and the installation of charging infrastructure the Openserve EV Deployment and Charging Viability Model (EVD-CVM) an AI-powered geospatial decision-support tool was created.

1. Data Integration

The process begins with data intake via APIs which is the first step in the process. The model gathers information from and incorporates it from:

- The GPS routes and locations of Openserve's facilities
- Connect to the power grid
- Databases of public EV charging stations (e.g. plug-sharing grid cars and zero carbon charging.
- API's for telecom network coverage

All this information is stored in a **central geospatial database** (Post GIS-backed).

2. AI-Powered Analysis Engine

At the core of the model lies an AI-powered analysis engine that:

- Performs range analysis (based on a 250 km BEV range) and route mapping to assess coverage.
- Evaluates connectivity through telecom coverage data.
- Applies a viability scoring algorithm that ranks each region as Viable, Augmentation Needed, or Not Viable, based on route density, charging proximity, and network quality.

Initially, the proof-of-concept uses rule-based logic, which will later be replaced by a Light GBM machine-learning model for predictive scoring.

3. Visualization and Decision Support

The results of our solution are visualized through a web-based GIS dashboard (built with Leaflet/Mapbox and React).
This interactive map allows planners to:

- View all data layers (fleet routes, charging stations, telecom coverage, grid points).
- Filter regions by viability status.
- Access detailed recommendations, such as charger counts or grid upgrade needs.

This makes complex technical data easy to interpret, providing actionable insights for investment and planning.

4. Phased Implementation

The full solution is implemented in three phases:

1. Data Collection and Framework Design (2 months)
2. Model Development and Validation in pilot provinces (Gauteng and Western Cape) (3 months)
3. Dashboard Deployment and Final Reporting (1 month)

5. Prototype and Proof-of-Concept

A functional prototype demonstrates the system using Synthetic Data and Openserve data.
It:

- Cleans and map-matches GPS traces with Python ETL scripts.
- Produces BEV viability scores per facility.
- Provides a responsive web interface with an interactive map, filters, and detailed analytics.
  Initial pilot results revealed high-impact candidate sites and validated the system's decision-making capability.

Below is an example of how our solution works so far.

figure1. Landing Page

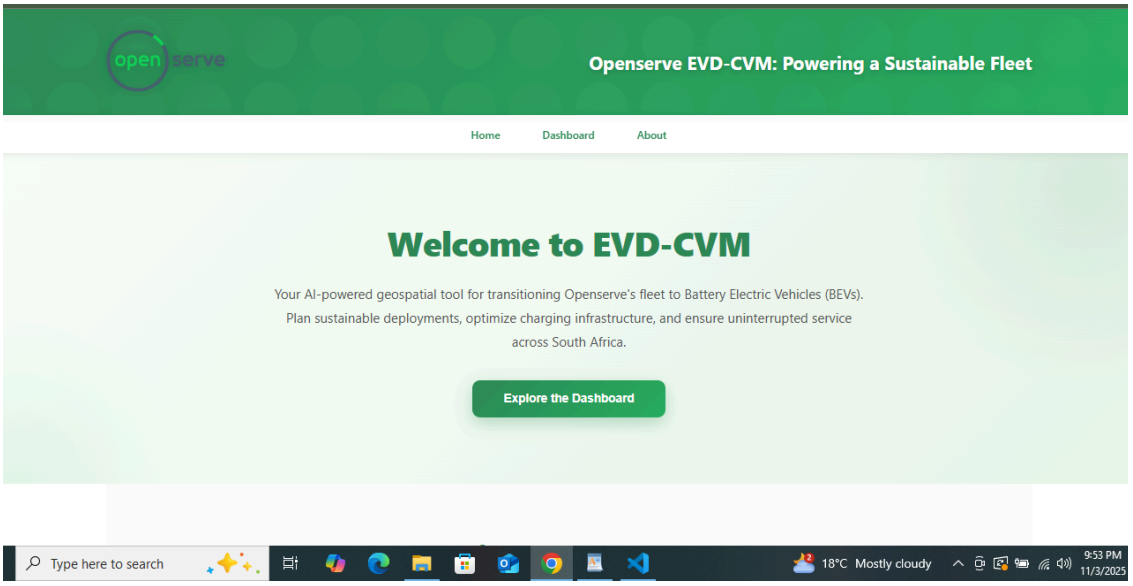


Figure2&3. Dashboard

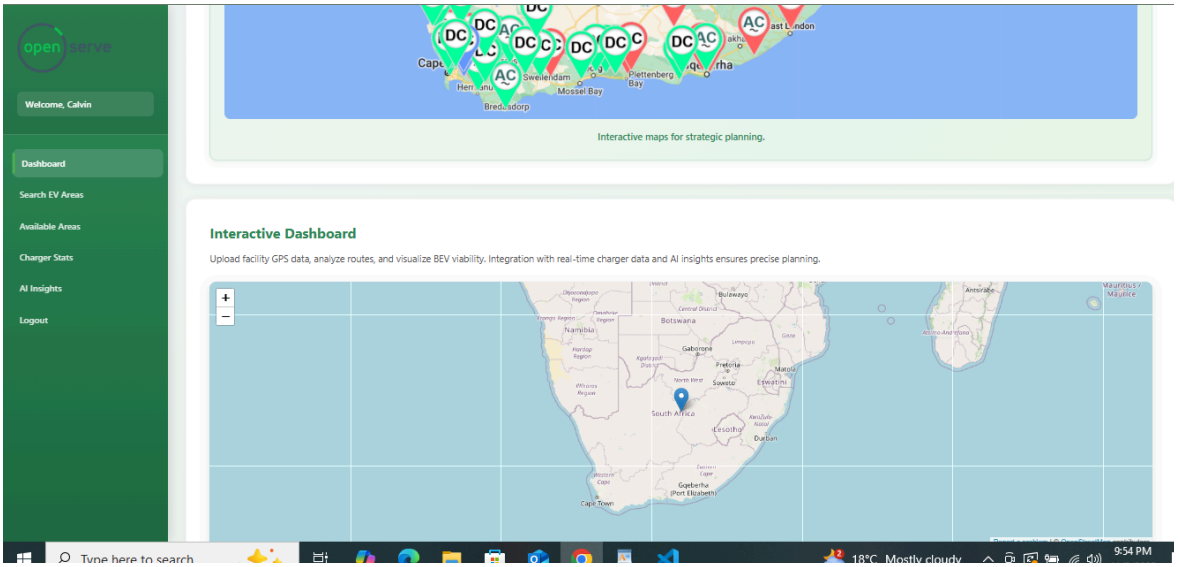
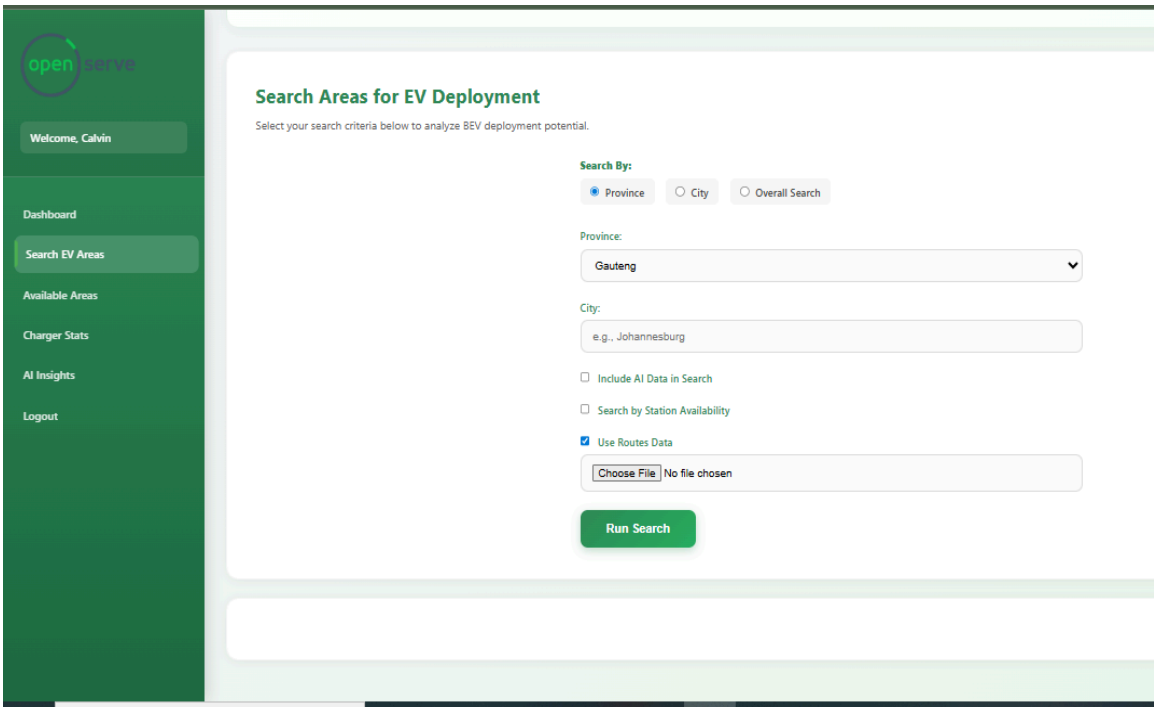

Welcome, Calvin
Dashboard
Search EV Areas
Available Areas
Charger Stats
AI Insights
Logout
Interactive maps for strategic planning.
Interactive Dashboard
Upload facility GPS data, analyze routes, and visualize BEV viability. Integration with real-time charger data and AI insights ensures precise planning.
Type here to search
18°C Mostly cloudy
9:54 PM

figure3


Welcome, Calvin
Dashboard
Search EV Areas
Available Areas
Charger Stats
AI Insights
Logout
Search Areas for EV Deployment
Select your search criteria below to analyze BEV deployment potential.
Search By:
Province
City
Overall Search
Province:
Gauteng
City:
e.g., Johannesburg
Include AI Data in Search
Search by Station Availability
Use Routes Data
Choose File
No file chosen
Run Search