SunOptimize Technologies

Rooftop Solar Potential Optimization for Sustainable Energy in Nairobi

MEET THE TEAM!

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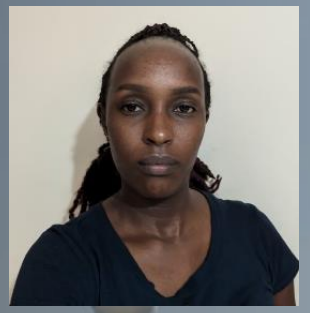
Data Scientist



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&
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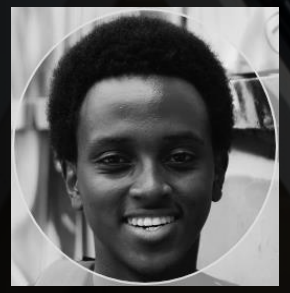

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BUSINESS OVERVIEW

- **SunOptimize Technologies**: A pioneering company dedicated to revolutionizing the energy landscape through solar innovation.

- **Commitment to sustainability and efficiency** by empowering individuals, businesses, and communities to embrace solar energy solutions.

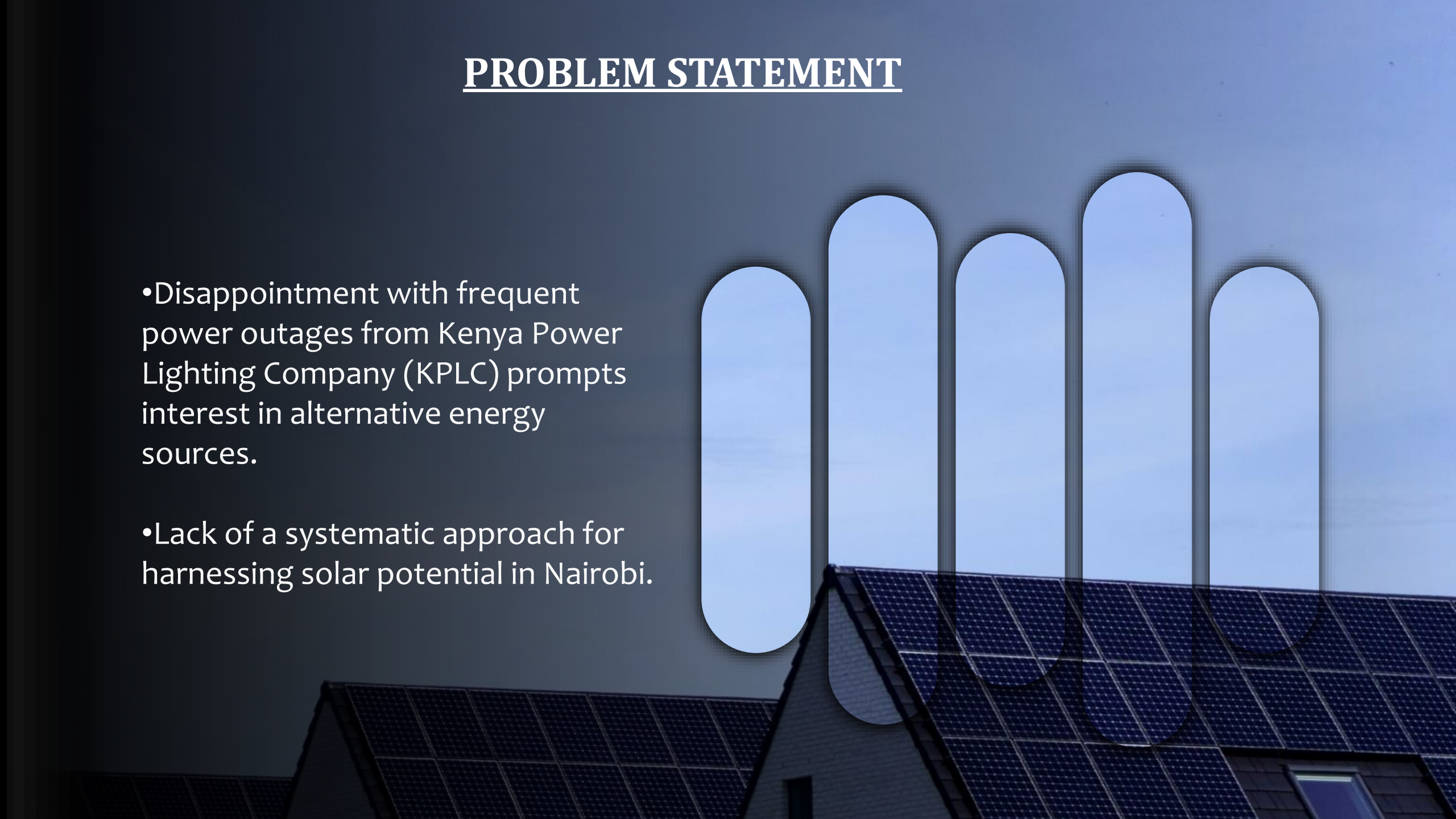
- **Stakeholders:** Property owners and managers, solar installation companies, Energy Regulatory Authorities.

- **Challenges:** Absence of precise insights and leveraging vector dataset hinder informed decision-making and implementation of solar power

PROBLEM STATEMENT

- Disappointment with frequent power outages from Kenya Power Lighting Company (KPLC) prompts interest in alternative energy sources.

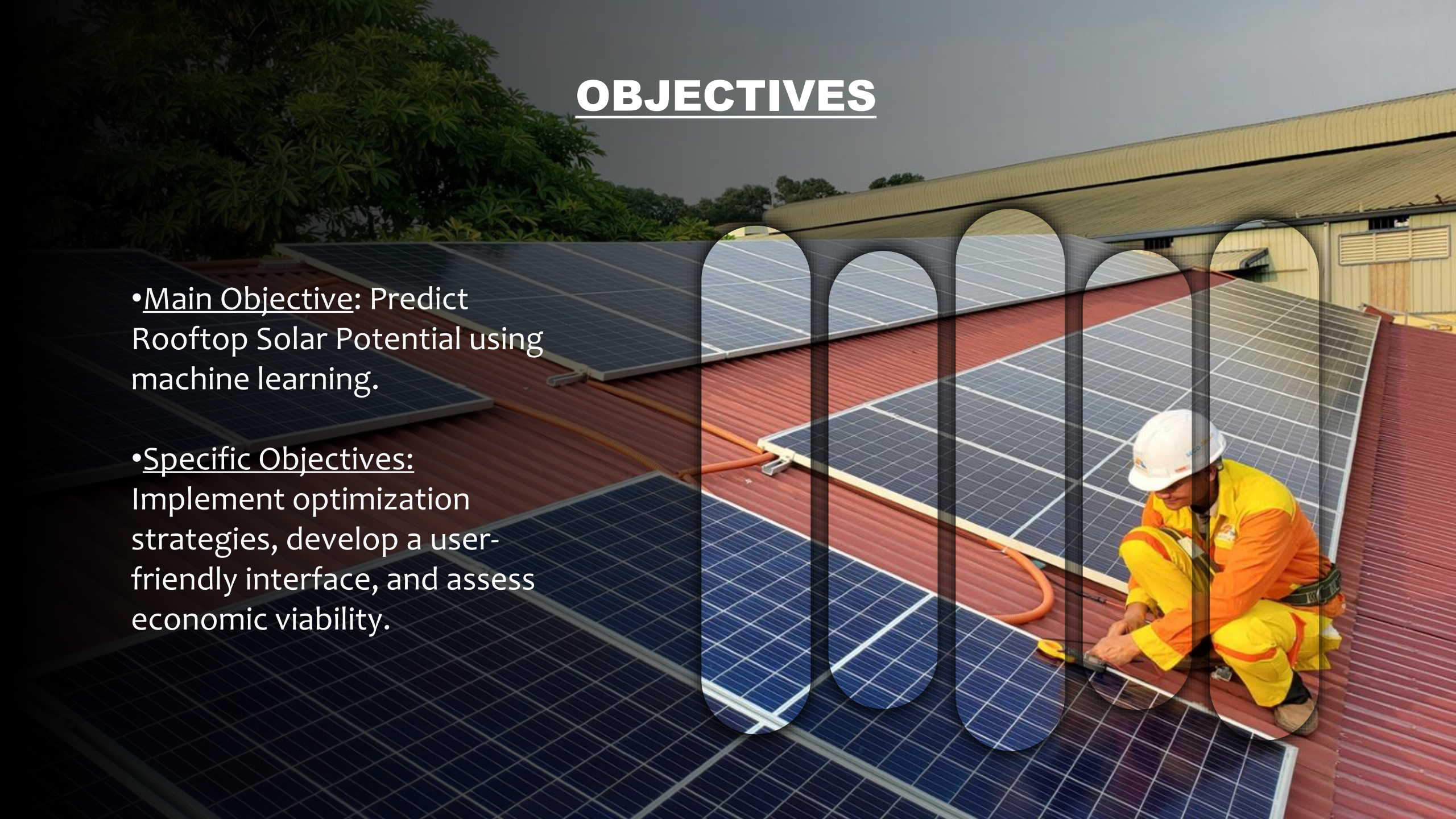
- Lack of a systematic approach for harnessing solar potential in Nairobi.



OBJECTIVES

- Main Objective: Predict Rooftop Solar Potential using machine learning.

- Specific Objectives: Implement optimization strategies, develop a user-friendly interface, and assess economic viability.



DATA UNDERSTANDING & PREPARATION

THE DATA

The data is from NEO which is a leading company in the Earth Observation (EO) business based in the Netherlands.

This dataset contains (272721 Rows x 9columns)

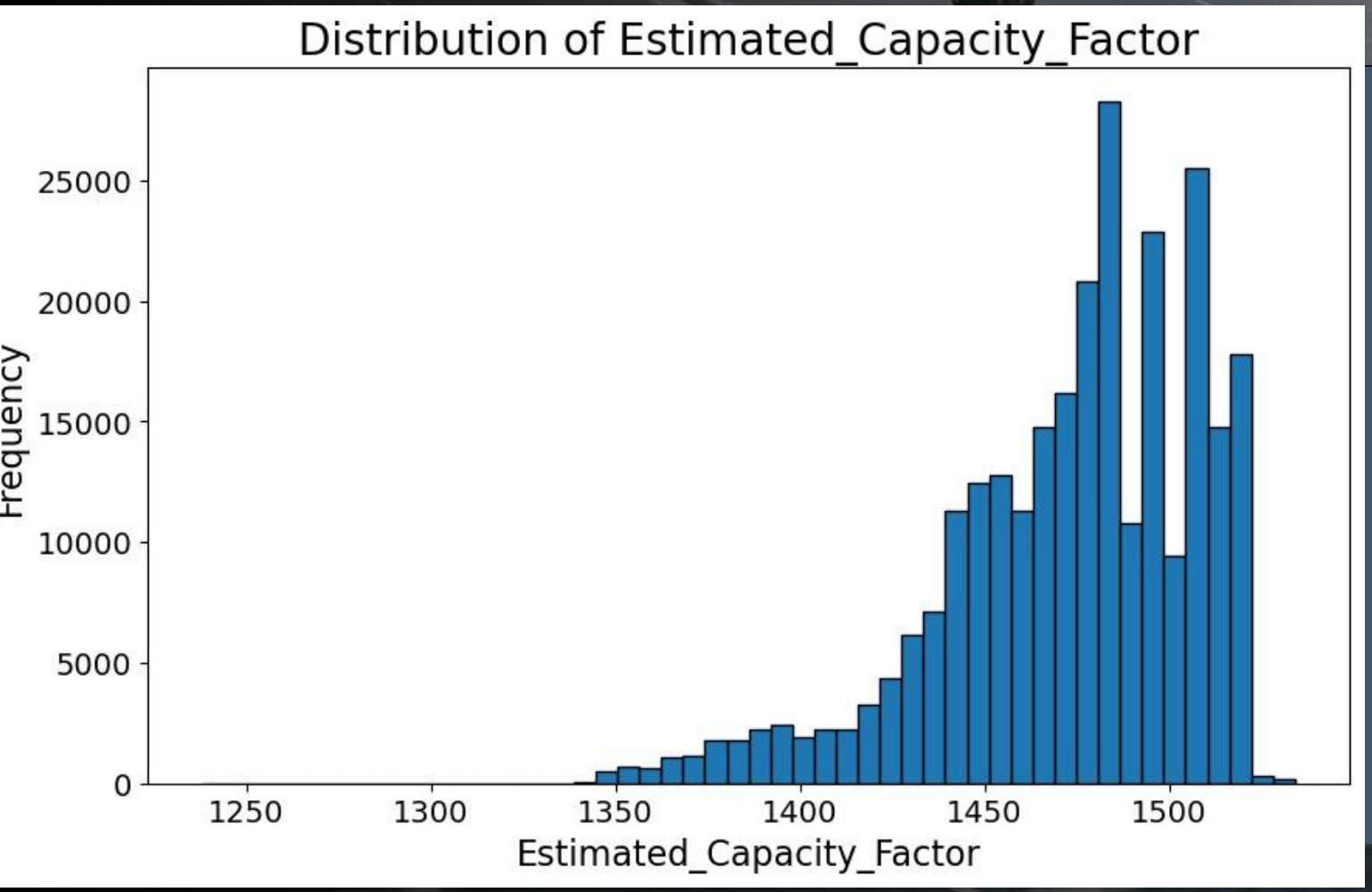
Types of data: numerical and categorical variables

Data cleaning involved removing unnecessary columns, handling missing values, and outliers.

Evaluation metrics: MAE, RMSE, and R-squared.

DATA ANALYSIS

UNIVARIATE ANALYSIS

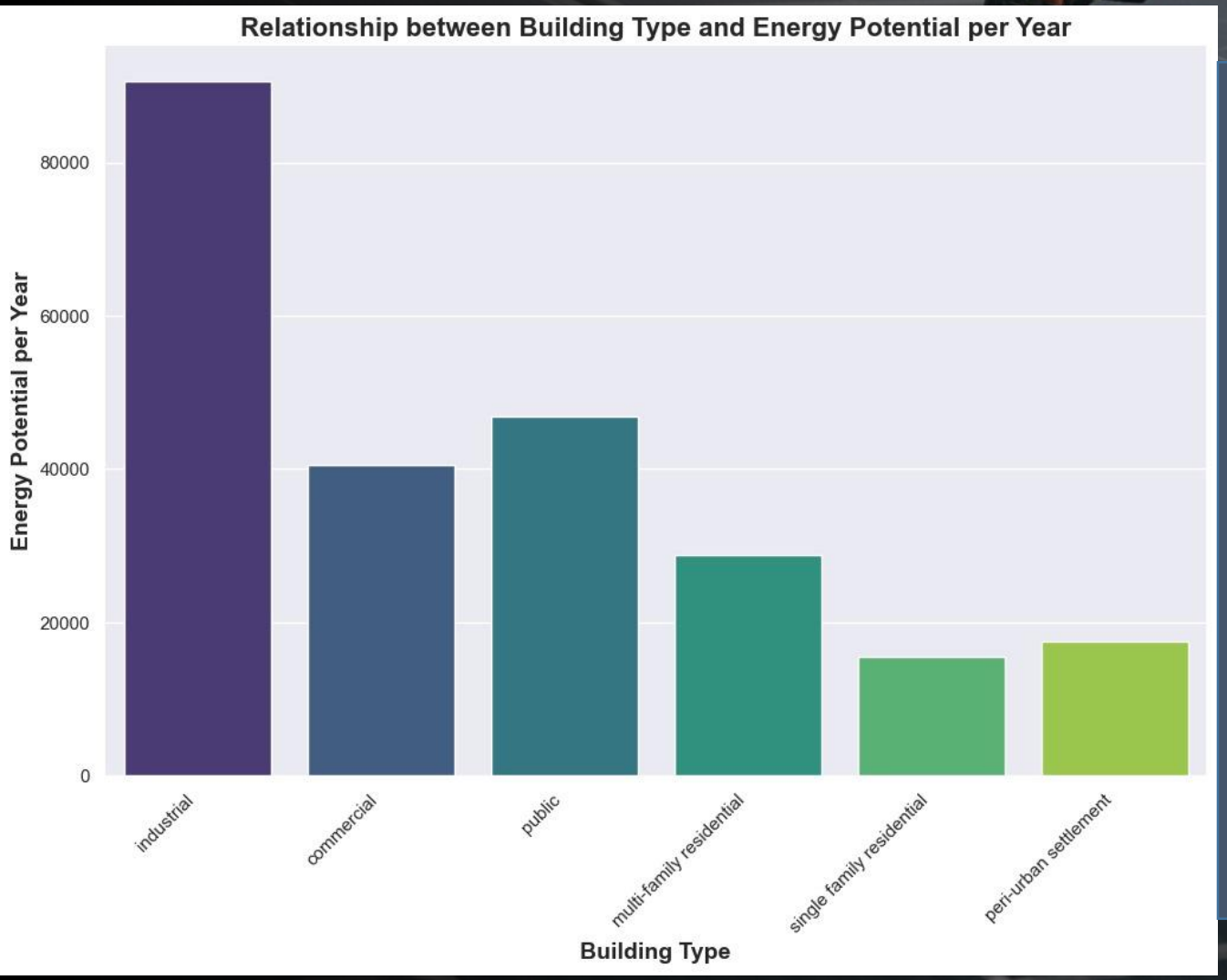


Given the distribution of the Estimated_Capacity_Factor column, it appears to be right-skewed.

In such cases, using the median for imputation is generally more appropriate.

This is because the median is less sensitive to outliers and skewed data, providing a more robust measure of central tendency.

BIVARIATE ANALYSIS



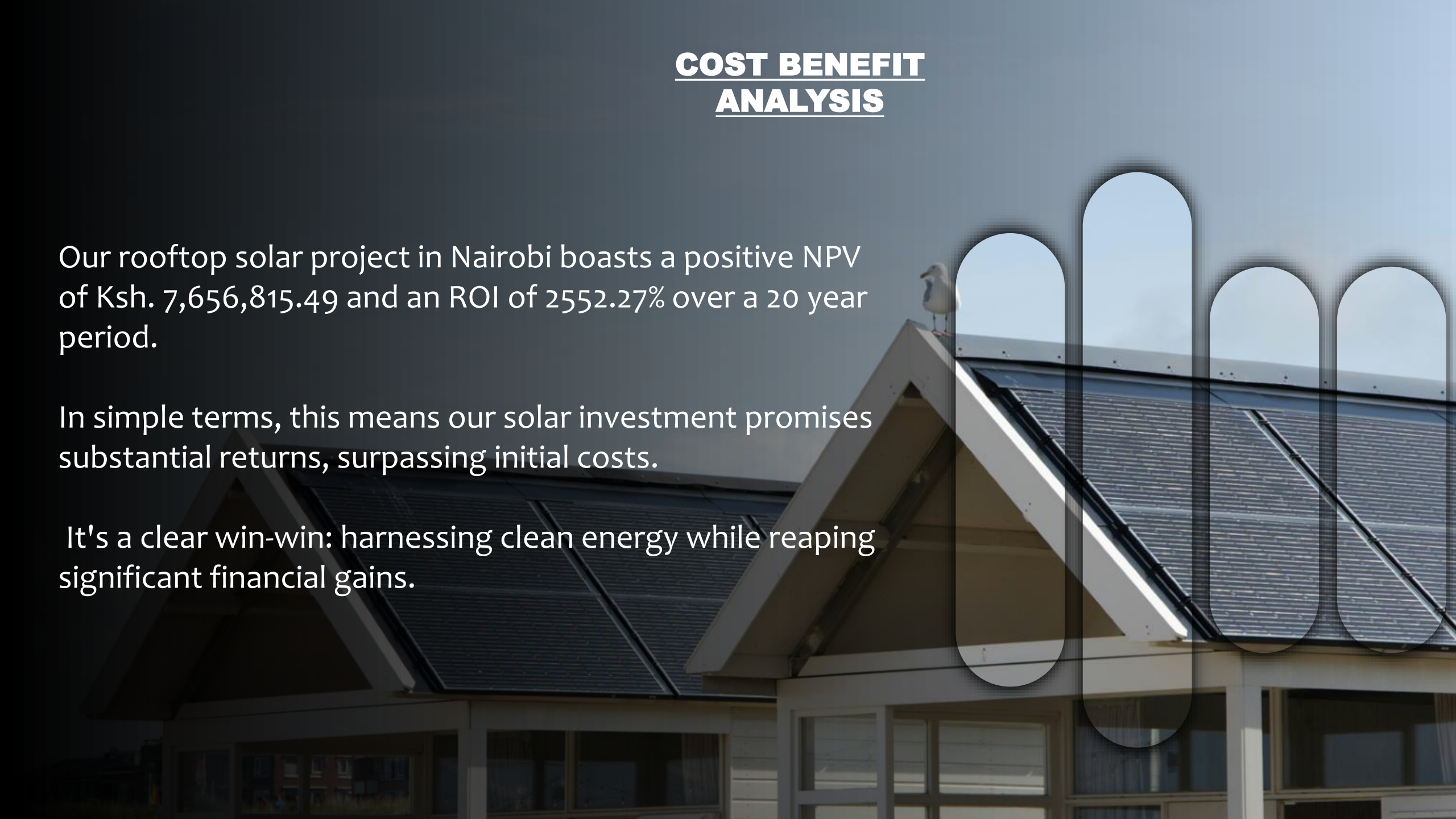
Industrial buildings showcase the highest energy potential, with close to 80,000 KWH per year, while peri-urban settlement structures exhibit the lowest energy potential.

COST BENEFIT ANALYSIS

Our rooftop solar project in Nairobi boasts a positive NPV of Ksh. 7,656,815.49 and an ROI of 2552.27% over a 20 year period.

In simple terms, this means our solar investment promises substantial returns, surpassing initial costs.

It's a clear win-win: harnessing clean energy while reaping significant financial gains.



MODELING

While the Tuned XGBoost Model demonstrates strong performance, the Neural Networks Model showcases superior accuracy and predictive capabilities on both the training and testing sets.

Neural Network

MSE

486,404.14

R-Squared Score

99.98%

Tuned XGBoost Model

MSE

5,028,871.68

R-Squared Score

97.26%

CONCLUSIONS

Growing Interest in Solar Energy

User-Friendly Interface

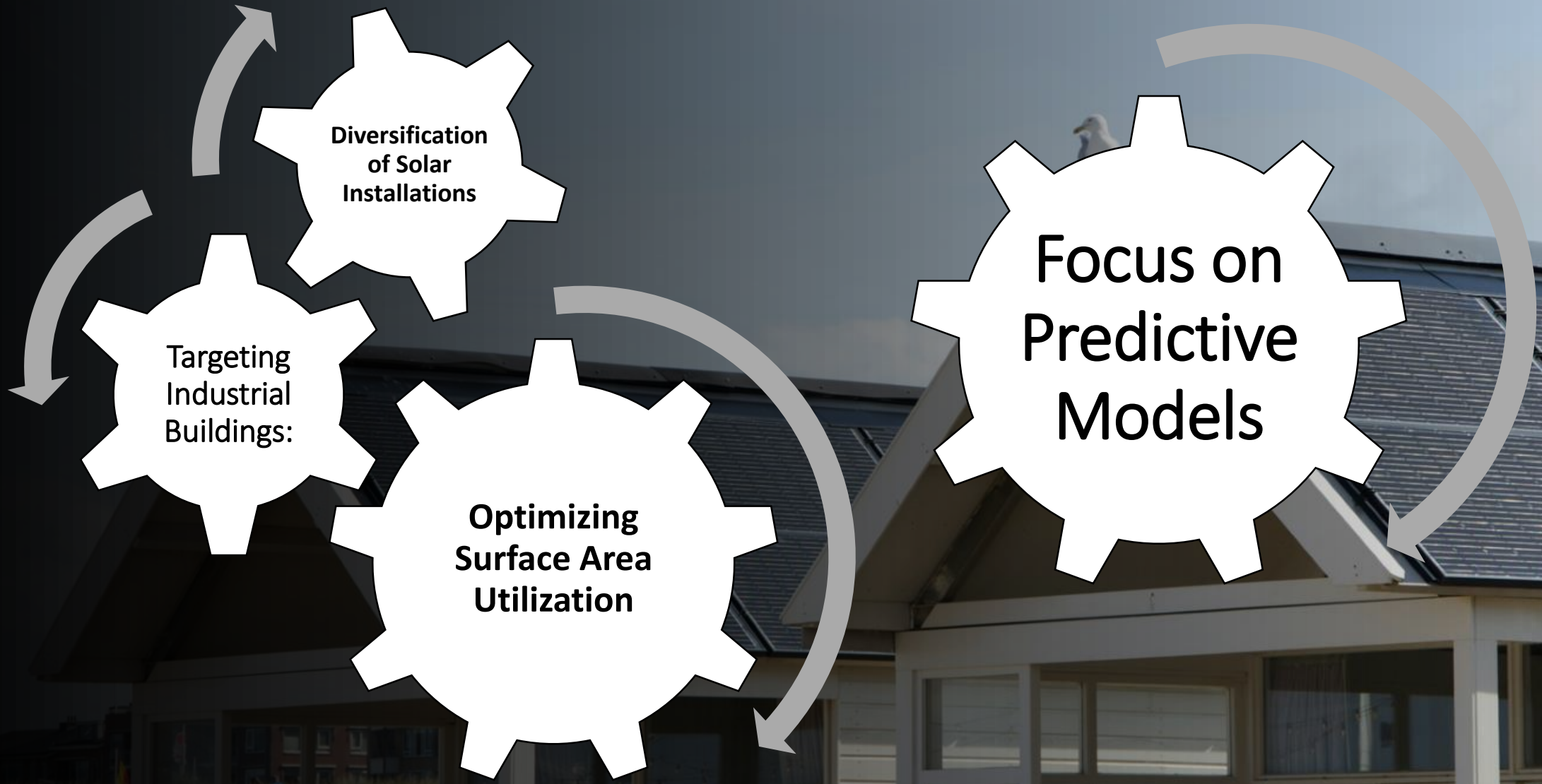
Cost-Benefit Analysis

Stakeholder Engagement

Lack of Systematic Approach

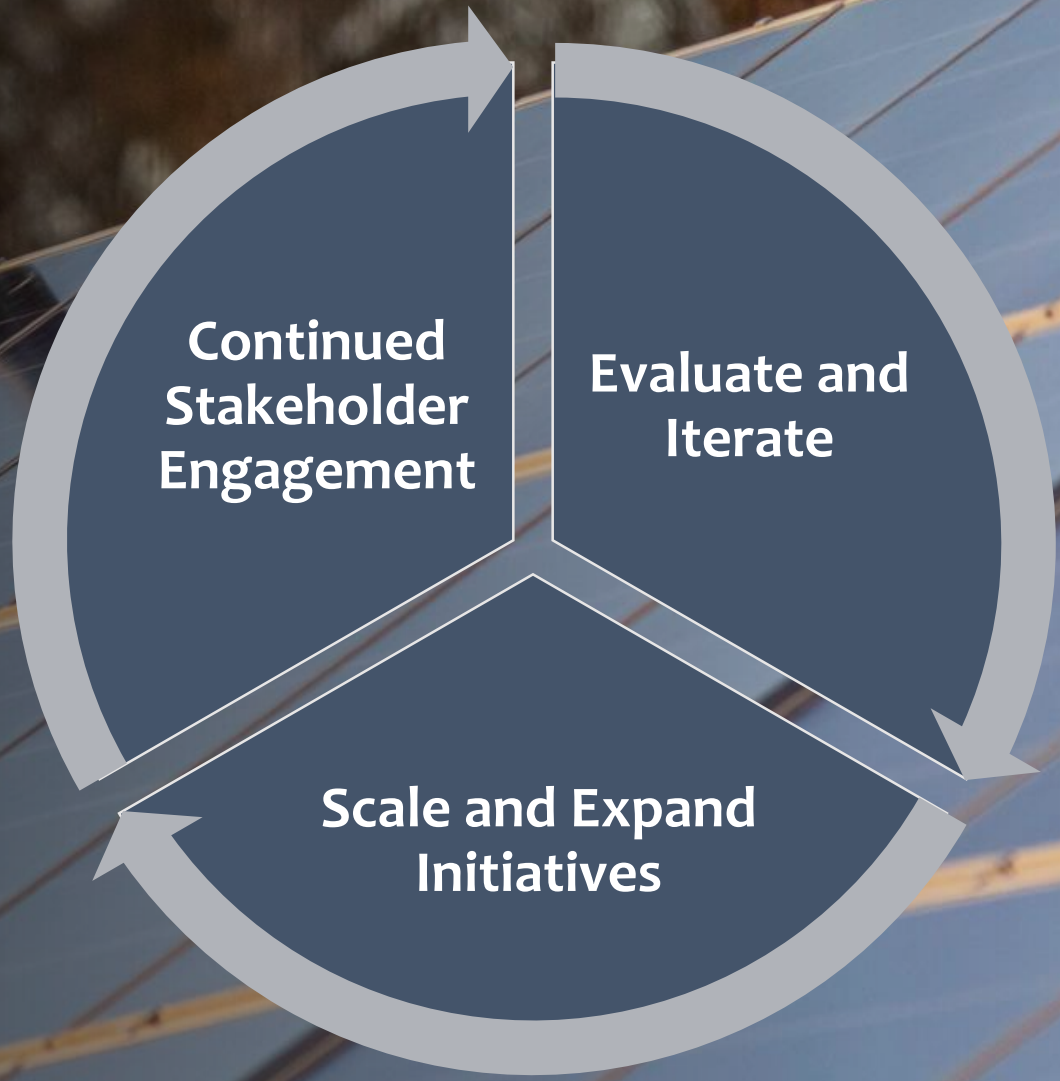
RECOMMENDATIONS

Recommendations for Rooftop Solar Potential Optimization:



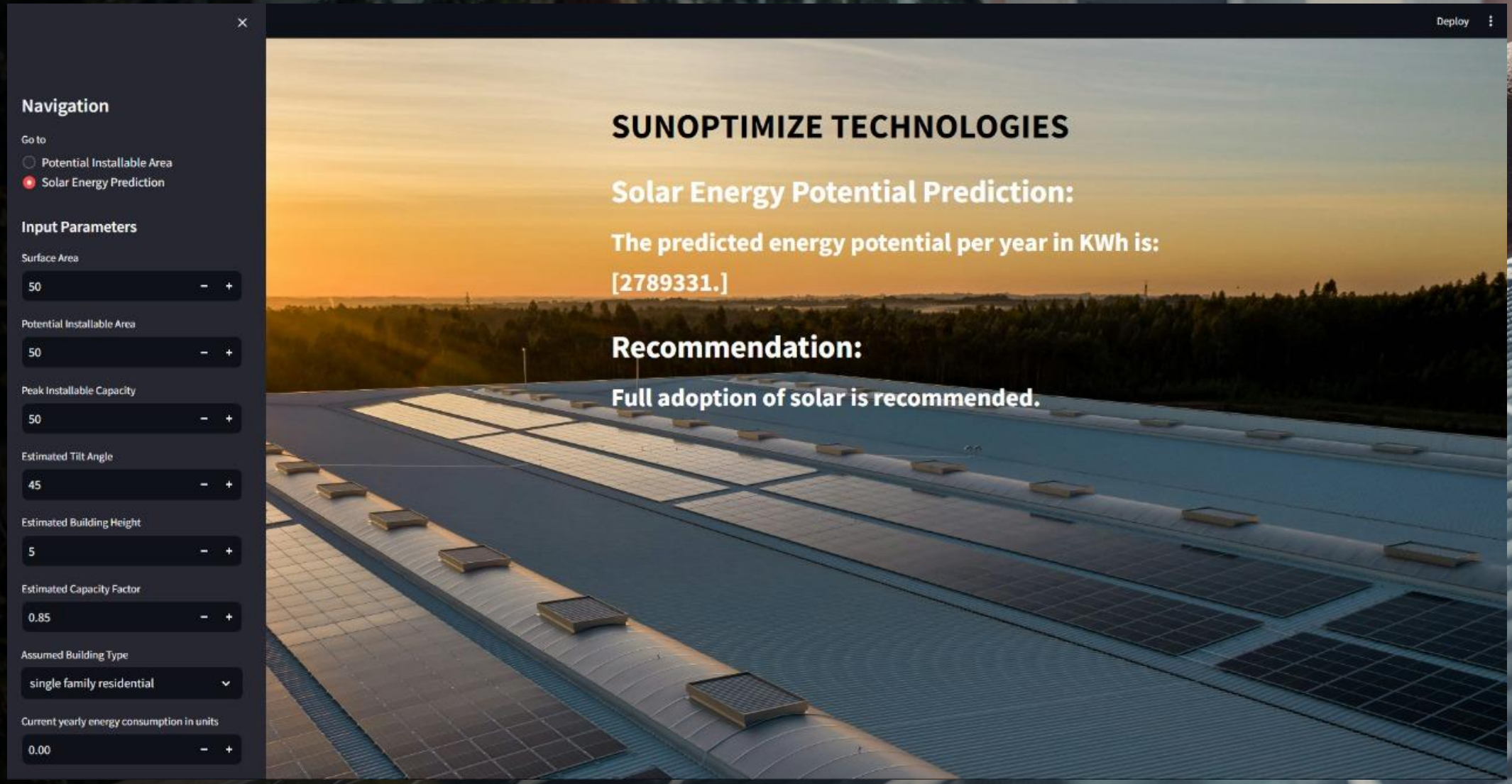
NEXT STEPS

By pursuing these next steps, stakeholders can further advance the adoption of rooftop solar installations, expand renewable energy generation capacity, and contribute to the sustainability goals of Nairobi and beyond.



DEPLOYMENT

Deploying the Streamlit web application.



Thank You!
Open Floor for Feedback and Inquires.