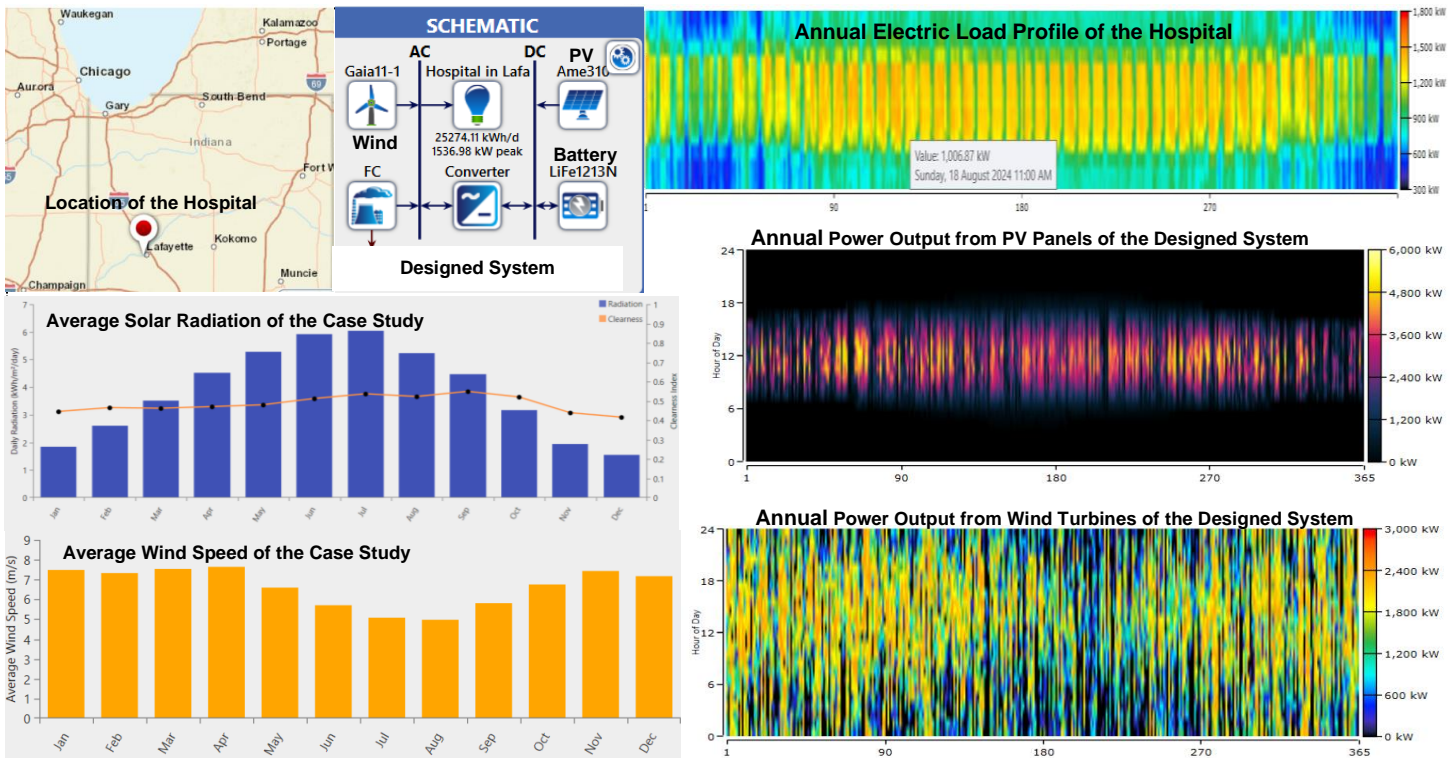# Remotely Sensed Image Data for Renewable Energy Systems Design in Indiana.

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Project Overview: This project uses remotely sensed image data to design a hybrid photovoltaic (PV) and wind energy system for Franciscan Health Lafayette East, a hospital in Lafayette, Indiana. This design effort addresses the need to transition Indiana's energy generation from coal (52% of electricity) to renewable energy, currently comprising 12%.

Key Objectives:

- **Objective 1:** Optimize the use of public domain remotely sensed data.
- **Objective 2:** Minimize the net present cost of the renewable energy system.
- **Objective 3:** Maximize reliance on PV and wind systems to reduce greenhouse gas emissions.

Selected Results:

- **System Design:** The optimal hybrid system includes a 5,831 kW PV system, a 231 kW wind turbine system, and a 250 kW natural gas-powered fuel cell generator, identified based on minimizing net present cost and fossil fuel emissions while effectively utilizing remotely sensed data.

- **Data-Driven Insights:** The integration of remotely sensed data allowed for precise resource assessment, optimizing the placement and performance of the PV and wind systems.

Utilization of Funds: The project was funded with $1,500 from the IndianaView, with an additional contribution of $1,352 from Purdue University Northwest's ECE department, to purchase the HOMER (Hybrid Optimization of Multiple Energy Resources) software for this research.

Student Involvement: A graduate student was trained to design the hybrid PV-wind system using the HOMER software. This design has been integrated into the "Modern Electricity Markets in Smart Grid" course project, taught by the PI in Fall 2024, involving 32 undergraduate and graduate students. The course emphasizes renewable energy system design related to electricity markets in smart grids, aligning with IndianaView's goal of using remote sensing data in education. Additionally, the graduate student co-authored a paper, submitted to the *IEEE International Conference on Communication, Computing, and Industry*. The paper acknowledges IndianaView's sponsorship and highlights the project's use of remote sensing data.