Abstract

We further narrowed down which site to choose by comparing and contrasting the attributes of each site against the transmission line or graded road. A utility-scale site could produce at least 5 kWh/m²/day, is on at least 40 acres of land, and is a maximum of 10 miles away from any transmission line or graded road. A large-scale site could produce at least 3.5 kWh/m²/day, is on at least 2 acres of land, and is a maximum of 1 mile away from any transmission line or graded road. A utility-scale site could produce at least 2.5 kWh/m²/day. A large-scale site could produce at least 1.5 kWh/m²/day, is on at least 0.5 acres of land, and is a maximum of 0.5 miles away from any transmission line or graded road.

Project Overview

The project involved using data from the Environmental Protection Agency (EPA), Indiana Department of Environmental management (IDEM), and Beacon. According to the EPA, creating solar plants is one of the best ways to redevelop the aforementioned brownfields. The project is highly encouraged by the City of Muncie as the mayor is promoting the development of solar energy in former brownfields.

For this project, the class studied brownfield redevelopment programs and the solar potential of the 32 sites. The class visited Kokomo Solar 1 – a brownfield redevelopment that creates solar energy for the surrounding community. The class worked in partnership with Ball State University, Ball State Center for Energy Research/Education/Service, and the Hoosier Chapter of the Sierra Club.

Project Objectives

The Brownfield to Brightfield project intends to:
- Promote the use of renewable energy
- Help clean and heal the environment
- Eliminate potential blights on the land and turn it into a renewable resource farm that helps the community
- Educate students about renewable energy as a means to clean up areas
- Encourage local residents to understand the economic and environmental benefits of solar farms for their community

Method of Site Selection

Taking Inventory

Began with 32 different brownfields and vacant lots throughout the Muncie area.

Analysis of Site Characteristics

Through research and online databases, information about each site and its characteristics was gathered and compiled into an ArcGIS map.

Categorized by Solar Capacity

Based on information gathered, each site was matched to a photovoltaic solar system which aligned with the site characteristics and solar capacity.

Final Selections

Comparisons were made between the sites, and the most productive and efficient Utility-Scale sites are chosen to the right.

Region Overview

Central Eastern Indiana is composed of 8 counties that were all established in the 1800s gas boom. The 8 counties are Blackford, Hancock, Henry, Jay, Madison, Wayne, Randolph, and Delaware. The gas boom created many glass factories, manufacturing, and automotive jobs, especially in Muncie and Anderson, the two largest cities in the region. In the 1980s, automobile and other factory jobs were declining, and the Central Eastern Indiana region became a part of the Rust Belt. This decline resulted in many vacant properties which experienced decades of polluting industry, thus becoming the brownfields seen around the city of Muncie today.

Muncie is located within Delaware County which sits in the middle of this region and was once the heart of the gas boom industry.

Site Selection Process

Our studio worked with 32 different brownfields and vacant lots in the Muncie area, with different scales such as off-grid, large scale, utility scale, and rooftop. We chose the top two utility-scale sites that would provide the most amount of solar energy for the city of Muncie to present.

To gather information on each of the sites, we used data from the Indiana Department of Environmental Management (IDEM), Beacon, and the PV Watts Calculator.

We collected the following information on every site: the address(es) of each lot, the brownfield programs each site was in, the acreage, zoning, municipality, distance to substations, transmission lines, and major roads. Each site also had information on who owned the site, a summary of the existing land use, any financial information available, the estimated solar output, how much money would be saved from installing solar, and how many items could be powered by the energy produced.

We decided that we could break down each site into the following categories: off-grid, large scale, and utility scale. Off-grid means that the site could produce at least 2.5 kWh/m²/day. A large scale site could produce at least 3.5 kWh/m²/day, is on at least 2 acres of land, and is a maximum of 1 mile away from any transmission line or graded road. A utility scale site could produce at least 5 kWh/m²/day, is on at least 40 acres of land, and is a maximum of 10 miles away from any transmission line or graded road.

We further narrowed down which site to choose by comparing and contrasting the attributes of each site against the rest of the sites available. We took each site’s size, their distance to the substations, the size of each lot, what was on each site, as well as any contaminants in the soil into consideration before coming to a final conclusion.

Brightfield for Bright Future Project:
Brightfield for a Brighter Future Project: Solar Potential Analysis for the City of Muncie

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Project Objectives

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Delaware Advancement Corporation North/South
- Address: 4502 S. Delaware Dr
- Brownfield Program: EPA Brownfields
- Area: 100.1 acres
- Zoning: Industrial
- Municipality: Muncie, Delaware County, IN
- Distance to Substation: 1.27 mi
- Distance to Transmission line: 0.55 mi
- Distance to Major Road: 0 mi
- Estimated Annual Solar Energy Production: 83,021,112 kWh
- Estimated Annual Energy Value: $7,056,797
- Estimated Solar Power Capacity: 9,477,295 W
- Greenhouse gas equivalencies:
  - 3,972 homes’ electricity use for one year
  - 5,828 homes’ electricity use for one year
  - 44,957 acres of U.S. forests in one year

Utility-Scale Solar PV Installation:

- Address: 1200 W 8th Street, Muncie, IN 47302
- Brownfield Program: EPA Brownfields
- Area: 58.39 acres
- Zoning: Intensive Industrial
- Municipality: Southwest Neighborhood, City of Muncie, Delaware County, IN
- Distance to Substation: 0.6 mi
- Distance to Transmission Line: 0 mi
- Distance to Major Road: 0 mi
- Estimated Annual Solar Energy Production: 48,688,712 kWh
- Estimated Annual Energy Value: $413,540
- Estimated Solar Power Capacity: 5,558,072 kW
- Greenhouse gas equivalencies:
  - 3,972 homes’ electricity use for one year
  - 5,828 homes’ electricity use for one year
  - 44,957 acres of U.S. forests in one year