Abstract

As Global Climate Change (GCC) becomes an increasingly pressing issue, the shift towards renewable energy has renewed urgency. Not only will renewable energy bring us closer to energy independence and energy security, but it will also yield cleaner air and mitigate the severity of the effects of GCC. Solar currently generates roughly 2.7% of the United States' power, leaving much room for improvement. Small-scale photovoltaic farms tend to be cheaper and easier to develop than their larger counterparts. As decentralized energy plays an important role in energy security having many small plants rather than few large plants prompted the inspiration for this thesis.

This thesis incorporates GIS techniques to determine suitable sites for small-scale (1-20 MW) fixed-axis flat panel photovoltaic (PV) solar farms in Fresno County, CA. By employing street, parcel, and zoning data from the Fresno County website, Digital Elevation Model (DEM) data from the United States Geological Survey (USGS), and transmission line data within Esri's ArcGIS 10.2 (and tools such as the Area Solar Radiation and Slope tools), this thesis identifies suitable sites for a small scale fixed axis photovoltaic plant. By visualizing this information, we provide a guide for developers to reference for future developers, government decision makers, and researchers. Ultimately, this thesis was able to take a large sample size of available land, and narrow it down to a few thousand parcels based on suitability in the categories listed above, and illustrate it on a map in a meaningful way. A key observation that resulted from this study was that a lack of human infrastructure and terrain were the primary limiting factor when it comes to site suitability for PV plants, which is also a common observation with many previous studies.