

MS Thesis Defense

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Title: Analyzing Photovoltaic Potential Using A Geographic Information System: A Case Study Of Prince William County Public Schools

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ABSTRACT

This thesis researches the potential of rooftop photovoltaic installations on public school buildings using insolation maps and data created using geographic information systems. Electricity is a fundamental need; however, the environmental repercussions from the combustion of fossil fuels have led to increasing use of renewable energy sources. Utilizing renewable energy technologies at public education facilities provides unique educational opportunities through public demonstration projects, field trials, and enhanced curriculum, in addition to reducing pollutants and environmental damage. The flat-roofed middle school and high school buildings in Prince William County, Virginia are ideally suited for harnessing solar power, and each building is analyzed using the Solar Analyst extension in ArcGIS to calculate incoming global solar radiation using atmospheric parameters observed in nearby Sterling, Virginia. This quantitative analysis combined with qualitative information from Prince William County Public Schools identifies Parkside Middle School and Potomac High School as the most appropriate sites for photovoltaic systems. The findings of this research a) demonstrate the ability of Solar Analyst to model insolation over a complex topography; b) compare the results from default Solar Analyst parameter values to location-specific values; and c) identify prospective public school locations in Prince William County for distributed generation photovoltaic installations to reduce demand from the electrical grid.