COAL BELT TO SUN BELT: USING FORMER MINE MOUTH COAL PLANTS FOR UTILITY-SCALE SOLAR PHOTOVOLTAIC POWER PLANTS IN ERCOT

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ABSTRACT

Market changes in the Texas electric grid have forced the retirement of coal-fired generation in ERCOT. Low wholesale power prices, cheap and abundant natural gas, and increased renewable energy generation have made coal generation no longer profitable. The plants being shuttered are "mine-mouth" plants that generated electricity from coal strip-mined onsite across the lignite belts found in East Texas. These mines span thousands of acres and are in the process of being reclaimed. The plants connected to these mines retain power infrastructure, specifically substations and transmission lines, which represents a significant public investment.

Simultaneously, the cost of solar photovoltaic (PV) panels has declined dramatically in recent years due to advances in manufacturing. While the highest concentrations of solar insolation in Texas are located in the West, the demand from the populous load centers of Dallas, Houston, Austin, and San Antonio are located in the east. Connecting the solar resource to the demand requires expensive transmission infrastructure and can trigger high congestion rent prices.

This paper explores the opportunities and challenges of repurposing a portion of the Monticello Winfield Mine in East Texas to install a utility-scale solar PV plant. The viability of solar for this site was evaluated in two parts. The EPA RE-Powering America's Land Initiative Solar Photovoltaic Decision Tree was used as an initial screening tool to identify the appropriate site characteristics. The NREL System Advisor Model (SAM) used hourly weather data and financial metrics to demonstrate solar performance and project value.

The results indicate that an area on the Monticello mine meets the initial site screening qualifications for a solar PV installation. Key criteria include the available solar resource, abundant flat and clear land, existing transmission infrastructure, and landowners amenable to solar generation. Performance data indicate that the solar PV output during the summer months could supplement seasonal peak demand. Further analysis could explore alternate financial structures such as leased land and property tax incentives for renewable generation, as well as benefits to the grid including ancillary services and voltage regulation.

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