Lighting the Way into the Future: The Future of Energy Economics

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Global warming has led to climate changes that threaten the sustainability of our planet. There is wide recognition in the US that growing amounts of energy of many kinds will be needed to maintain even our current standards of living. In this dissertation, I explore the potential for generating large amounts of electricity through environmentally friendly means using renewable energy sources that neither emit greenhouse gases nor produce dangerous waste byproducts.

I propose and evaluate the potential of a hypothetical project that involves the construction of ten large-scale solar farms, each covering approximately 1,043 square miles. The electricity generated by these farms would be transmitted to consumers via Ultra High Voltage Direct Current (UHVDC) power transmission cables. Additionally, a portion of this electricity would be stored in advanced battery storage systems to maintain a stable supply. These solar farms would be strategically located on federal lands, abandoned mines, and rooftops, optimizing land use while minimizing environmental impact.

The capital expenditures (CAPEX) estimates for this project include the costs of construction, equipment, and distribution associated with the ten facilities estimated to be approximately $1.34 per watt, about the same as a natural gas-fired plant but considerably lower than nuclear plants costing $5 to $6 per watt. The total cost will vary depending on the system's desired output, ranging from 5 Petawatts to just over 7 Petawatts of energy generation, which would be sufficient to power the entire nation into 2050. The time frame for construction is estimated at 5 to 8 years

My key conclusion is that such a scheme would, in theory, provide enough energy to cover all the energy needs of the United States at a reasonable cost. The broader implications of my analysis are that creative thought leadership is critical for our society and economy as we pursue economic growth in the face of highly uncertain degrees significant climate change and risk**.**