A Systems Methodology for Informed Solar Energy Decision Making

(Technical Report)

Driving Sustainable Power Adoption: US Policy and Promotion

(Sociotechnical Research Paper)

An Undergraduate Thesis Portfolio
Presented to the Faculty of the
School of Engineering and Applied Science
In Partial Fulfillment of the Requirements for the Degree
Bachelor of Science in Systems Engineering

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May 6, 2024

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Preface

The United States emitted 14 percent of the record global carbon dioxide emissions of 37.1 billion metric tons in 2021 (EPA, 2023c). US adoption of renewable energy must therefore be accelerated. Renewable energy can reduce air pollution and fossil fuel consumption and stimulate new economic opportunities.

The implementation of solar energy panels at the Brooks Family YMCA in Charlottesville, Virginia, will have a significant impact on the local community across technical, economic, and social facets. As the YMCA wants to become a beacon for clean energy in the Charlottesville community, this report aims to providing the YMCA Board and Leadership with a thorough analysis to guide their decision-making regarding vendor proposals. This analysis consists of a model to determine electricity-related metrics such as the percentage of kilowatt- hours of electricity offset annually with different financial models, incentives, and parameters. The model can calculate electricity production and economic metrics for commercial buildings interested in installing solar, explore alternatives, and create a standardized model that is less specific than those provided in solar companies' proposals. The complete analysis of all solar companies' proposals with a curated model will guide the YMCA on how best to proceed with the implementation of solar energy panels.

In the US, proponents of sustainable residential power systems can promote public policies to subsidize and accelerate their adoption, which is crucial to reduce carbon emissions and advance sustainable energy practices. Community, regional and national advocacies promote more sustainable residential power by seeking public subsidies that make them more affordable to homeowners. Efforts of this kind have already begun the

transition to clean energy (Ufer, 2023).