

Thesis Project Portfolio

Solar at the Brooks Family YMCA: An Informed Decision-Making Model

(Technical Report)

The Current State of the Energy Transition in the United States and its Effect on the Grid, the Environment, and Communities

(STS Research Paper)

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Table of Contents

Executive Summary

Solar at the Brooks Family YMCA: An Informed Decision-Making Model

The Current State of the Energy Transition in the United States and its Effect on the Grid, the Environment, and Communities

Prospectus

Executive Summary

Using electricity from renewable sources will be a key component in the fight against climate change. The YMCA in Charlottesville, Virginia became interested last year in the possibility of installing rooftop solar in their newly built (2017) facility. The research conducted focused around evaluating the structural and economic feasibility of rooftop solar for this building. The STS portion centered on renewable energy collectively in the US and the energy transition the country is currently undertaking. The goal was to evaluate the state of the energy transition and better understand the impact it has had on the grid, the environment, and our communities. The YMCA is just one small example of businesses and communities getting involved in the energy transition. It also highlights some of the issues or hurdles that can be faced in taking on this change.

Capstone

The YMCA was looking to be a community leader in the energy transition by not only investing in solar power, but also by taking the opportunity of on-site solar to provide education and engagement in the community. The team took the time to familiarize ourselves with the intricacies of solar installations on commercial-sized buildings prior to reaching out to four local solar energy providers for quotes. In receiving quotes, the team discovered the difficulties of directly comparing quotes, as each firm provided different options and highlighted different areas of their offer. Our team worked on creating a user-friendly, two-step model (economic and electrical) to help directly compare the quotes, which could be used for both this project and easily adapted for any other project within the US.

Of the four quotes received, we narrowed down our pick to one company whom we recommended, with stipulations, to the YMCA. We came to this conclusion both by using our two-step model and considering other factors of the project such as structural limitations of the building and professionalism of the company. The structural limitations greatly affected the project as the building was built in 2017 and no extra capacity for solar panels was added in the design. The only company who sent someone to see the building, walk the roof, and consider weight and structural limitations of the building was the company we recommended to the YMCA. Our team thus set up the YMCA with all the information needed to move forward with a solar installation.

STS Research

The STS portion of the research was seeking to better understand the current state of the energy transition nationwide and to assess its success and effects. This analysis is essential for evaluating the large undertaking that is the energy transition in the US. The paper synthesized information from a variety of literary sources to gather a cohesive conclusion to this inquiry.

Overall, the US is only about one fifth of the way to a completely carbon-free grid and the transition will get considerably more difficult as increasingly variable sources of energy (solar, wind) will rely on battery technologies. However, the benefits will most likely outweigh the costs of climate change caused by the grid neglecting to adapt its energy sources to renewable technologies.

Conclusion

Overall, the energy transition in the US is well underway, though its continued implementation will rely upon innovation and the insistence of those determined to mitigate the effects of climate change for all of us.