

Sociotechnical Synthesis

STS 4600

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Levi Otis

Bachelor of Science, School of Engineering

Signature _____ *Levi Otis* _____ Date 4/14/21

Levi Otis

Approved _____ Date _____

STS Advisor, Richard D. Jacques

Approved _____ Date _____

Michael Momot, Department of Mechanical Engineering

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Sociotechnical Synthesis

(Executive Summary)

Removing the Resistance to Wind Energy

It is well known in 2021 that the energy we now use consumes massive amounts of resources. One of the greatest challenges of our generation is trying to figure out more efficient ways to produce energy without harming the environment. This goal has created a need for major research and engineering. Two of the most well known forms of energy that are both renewable and clean are solar and wind energy. My thesis focuses on wind turbines with the goal of society adopting wind turbines more eagerly.

The goal is to make it easier for society and the government to adopt and build more wind turbine infrastructure so that a greater portion of the energy we use can be from clean and renewable energy sources. The technical portion of my thesis is on improving the blade design of wind turbines by making them quieter so turbines will be easier to place near urban areas. My STS research is on the benefits of moving turbines offshore. Moving turbines far offshore overcomes many of the issues people have with them. This further removes the resistance to them being built. Both my technical portion and my STS research portion have the goal of increasing the amount of energy we obtain from wind turbines.

In my STS research it is shown that offshore wind turbines overcomes the majority of the issues people have with wind turbines, including the way turbines disrupt the landscape and the way they are known to kill birds. Moving wind turbines offshore also helps with the noise they

make, and with transportation issues. Offshore wind turbines are able to support much larger turbines which increases turbine efficiency. While the long term solution to the majority of the major issues with wind turbines is moving them offshore, there is a massive amount of infrastructure that has to be put in place in order to build them offshore. Moving all turbines offshore is not immediately possible. Because of this the technical portion is focused on increasing the desirability of wind turbines on land.

The technical portion of my project is reducing the noise produced by wind turbines. Wind turbines can be heard from nearly two miles away. Since people live within a two mile radius of most places in the United States being able to build quieter wind turbines would be helpful in order for more of them to be approved. Our capstone project focused on blade design, which is where most of the noise comes from. We developed three different blades. One with nodes, one based off of an owl's wing, and one with a curved tip at the end. With these goals in mind the STS and Capstone project aims to increase the amount of wind turbines built in the United States.

The STS research helped gain an overall understanding of the issues with wind turbines and the challenges of building more of them. In my technical portion of the project I was able to delve deeper into one of the issues to gain a deeper understanding of the noise they make. Because I did both the research paper and the technical portion I was able to have a broad and specific understanding of the issues with wind turbines. Being able to increase the desirability of wind turbines would allow more of them to be built, and in turn would allow the earth to be harmed less by our current energy producing methods. I originally thought my thesis was going to be incredibly difficult but it ended up being easier and more enjoyable than I originally

anticipated. I gained a much better understanding and appreciation for wind turbines. When I see a wind turbine, I now see a great feat of engineering.