

Thesis Project Portfolio

Cost Effective Solar Powered Fan

(Technical Report)

The University as a Model for Sustainability and Catalyst for Development in the Surrounding Community

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

Environmental concerns have become a forefront issue worldwide as the detrimental consequences of climate change have exacerbated the need for sustainable solutions and efforts. As current trends in resource use and societal behaviors impact the environment in unsustainable ways, there is an increased pressure for communities to find solutions and invoke sustainable development. After four decades of efforts in sustainability, progress has been very unexceptional as climate change, biodiversity loss, deforestation, water quality degradation, and air pollution continue to stir public concern. Increased levels of greenhouse gases in the atmosphere continue to contribute to the imminent issue of global warming and climate change, and the problem of sustainable cooling and other environmental related issues become more reliant on technology to provide adequate living conditions.

Heating and cooling systems contribute to over 48% of residential energy with air conditioning releasing over 100 million tons of carbon dioxide yearly within the United States. Current cooling technologies also rely on human made gases that are almost 10,000 times more potent than carbon dioxide in trapping heat. Aside from its environmental impact, the lack of adequate cooling systems has serious detrimental effects on health, especially on the elderly, women, and children. In addition to being environmentally unsustainable, thermal conditioning has become financially unsustainable and strenuous on low income families looking to maintain comfortable living conditions within their home.

The concept of necessary sustainable development suggests several principles for implementation including, increased significance of sustainable efforts at the local and regional level, public and stakeholder participation, and integrative approaches to regional challenges. These principles essentially play on the idea of “think global, act local” in the context of

sustainable development. Given the urgency of environmental destruction, opportunities are emerging for universities to engage as change agents for sustainable development.

The technical work and STS research of this report both address the matter of developing sustainability, and the need for change through innovation and social development within regional infrastructure. The technical work for this report offers a design for a cost efficient self powered solar fan in order to address the lack of sustainable low cost cooling solutions. The current market lacks a low cost solar fan with energy storage, which is an essential feature for allowing operation of the fan when there lacks direct sunlight. The main focus for the design will be reducing the production cost in order to increase accessibility to a sustainable cooling option.

The STS research takes a closer look at regional sustainability development and the capacity for universities to become the core actors in shaping regional socio-economic infrastructure. This study breaks down universities' core areas of influence and analyzes a strategy for incorporating sustainability with knowledge transfer development, economic growth, and community engagement.

Both the technical and STS research are closely related as they both address different aspects of regional sustainability development. Both projects help me to further understand the synergy between technological innovation and social development and their roles within the larger blueprint of creating a more sustainable and aware community.