

Thesis Project Portfolio

Corn Bioethanol Production Facility Design

(Technical Report)

Examining the Hesitancy of America to Adopt Renewable Energy

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science
University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree
Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

(Executive summary)

Identifying solutions to global warming, and the obstacles in the way

Climate change has been forefront in the minds of many over the past several years, including politicians, celebrities, activists, and every day citizens. Despite of all this attention, fossil fuels still supply most of energy consumed in America today, and the renewable energy sector has been growing slower than expected. My STS research focused on why Americans are so unwilling to give up fossil fuels and fully commit to renewable energy, while my teams technical project aimed to design a bioethanol plant to supply more green energy. Only by both identifying roadblocks in green movement and providing solutions to the world's increasing energy needs can the world be made a greener place.

In my STS research, a deep analysis was performed to understand the specifics of why Americans resist fully adopting green energy. The most important finding was that there are three groups of people that resist the change for different reasons. The general American public has a general lack of understanding of the importance of preventing climate changed, fueled by an inability to read statistics. Corporate America resists renewables as there is so much money to be had in the fossil fuel industry, and the fossil fuel industry receives far more subsidies than the renewable energy industry. Most American politicians are unwilling to put forth substantial policy changes because of the millions that the energy industry spends on lobbying.

For my team's technical project, we designed a multimillion dollar plant to produce 150 million gallons of fuel-grade ethanal a year from corn. This ethanal can be mixed in with gasoline, reducing the amount of oil consumed each year. The plant will also produce a large quantity of dried distillers' grains and solubles which can be sold to feed livestock. Not only will this plant help to reduce the world's carbon footprint, but it will also aid local farmers as 250

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million dollars' worth of corn will be purchased each year. The plant will produce a yearly profit of 45.5 million dollars.

By performing both my STS research and plant design simultaneously, a deeper understanding of how this broad issue can be addressed was gained. Before starting my STS research, I assumed that global warming could be solved simply by supplying more renewable energy, but my research demonstrated how people's opinions need to be altered for true change to occur. If the public can be better educated on climate change, and corporations are given more incentives to produce green energy, then a real difference can be made.