Thesis Project Portfolio

Unfantastic Plastic: How Has Single-Use Plastic Reduction Affected Waste Management at the University of Virginia?

(Technical Report)

How the Plastic Pollution Coalition Fights Plastic Pollution

(STS Research Paper)

An Undergraduate Thesis

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Sociotechnical Synthesis

Waste is a very important and pressing issue in the area of environmental and human health. Trash creates greenhouse gas emissions, harms plants and wildlife, and can be toxic to humans. Therefore, both my technical and socio technical projects focus on the issue of waste, though in different contexts. The technical project is focused on the actual numbers associated with the landfilled, composted, and recycled waste at the University of Virginia, and analyzes the impact of Executive Order 77 banning single use plastic. In contrast, the sociotechnical project looks at the techniques that the Plastic Pollution Coalition, an advocacy organization, uses to spread their message. Together, these projects explore the question of how global waste production can be reduced.

My technical project is titled Unfantastic Plastic: How Has Single-Use Plastic Reduction Affected Waste Management at the University of Virginia. The purpose of this project is to analyze UVA's current waste stream and its effects on various sustainability goals. UVA has many sustainability goals, and the most notable ones to this project are their greenhouse gas emissions and landfilled waste goals. UVA is striving to be carbon neutral by 2030 and fossil fuel free by 2050, and to reduce landfilled waste to 30 percent of 2010 levels by 2030. With these goals in mind, metrics such as cost and greenhouse gas emissions were calculated based on UVA's status quo waste system that includes landfilled, composted, and recycled items. 2018 was used as the status quo year, and waste data was obtained from facilities management to determine each metric. In order to find emissions data for composting, landfilling, and recycling, we used data from sources like the EPA and published studies. After completing the status quo model, 2021 data was put into the model and the different waste composition was factored in to create different metrics. Within these models, different waste management strategies were

identified and analyzed to determine which strategy would produce the least greenhouse gas emissions and help UVA reach its sustainability goals. Surprisingly, when all of the waste data was analyzed, composting produced more GHG emissions per ton of waste than landfilling. While this was not the expected result, we determined that simply looking at the emissions data does not tell the whole story, and that composting also reduces land use and the health and environmental issues associated with landfills. With the Executive Order 77 which banned single use plastic in state facilities, composting is anticipated to increase at UVA. Therefore 4 scenarios were analyzed projecting changes to the aluminum, plastic, and compostables produced by UVA that might occur in the future. These scenarios can give UVA a better idea of how to prepare for the changes in its waste stream. There are many future questions that need to be answered around the waste management issue at UVA, and by creating this model, we hope to help future groups better manage and reduce UVA's waste.

My sociotechnical project is titled How the Plastic Pollution Coalition Fights Plastic Pollution and is an overview and evaluation of the most commonly used and effective techniques used by the Plastic Pollution Coalition (PPC). The PPC is a non-profit fighting against plastic pollution and consists of over 1,200 businesses, advocates, and individuals working together to spread the message of cutting plastic use. After analyzing the PPC's website and materials, I determined that the top three techniques were building a coalition, using social media, and providing small actions such as petitions and pledges for members or anyone else who wants to be involved. After identifying these techniques, I evaluated their effectiveness by researching studies that explored how they work in activism. I found that coalition building is a very effective and useful way to create a large community and bring in diverse perspectives to create meaningful change. I also found that using social media is an effective way to quickly and easily

spread awareness and knowledge to a large audience, allowing the PPC to broadcast their message to tens of thousands of people a day. Lastly, I found that petitions have been shown to be effective in creating an activist mindset and allowing people to make their voices heard, but that pledges have not been shown to be as effective. These techniques can be applied to other non-profit organizations and activists in the future to create a large, engaged, and informed community passionate about the issues they are fighting for.