

Thesis Project Portfolio

Modeling the Implications of Fugitive Gas Emissions on Building Heat Upgrade Decisions

(Technical Report)

The New Bridge to Renewable Energy: Relative Advantage and Compatibility

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

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Bachelor of Science, School of Engineering

Mary Addison (Maddie) Robinson

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Department of Engineering Systems and Environment

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Sociotechnical Synthesis

Current decision-making tools for building owners choosing whether or not to update their infrastructure fail to incorporate environmental considerations with cost considerations. This means that things like leaky infrastructure, global warming potential, the cost of carbon, and their impacts into the future are not considered. We are creating a model that incorporates all of these inputs to the system and integrates the two pillars (financial and environmental) into one unified decision. It also takes into account different scenarios and sensitivities based on the progression of US policy toward natural gas and emissions. It is crucial to consider the human and social dimensions of this tool to make sure it is useful to *all* who may need it. Every single building has the capacity to reduce emissions and each minute reduction lessens the effect of climate change, so the more people that are considered in adaptations of this model means more emissions we can help eliminate.

While my technical project focuses more on looking at individual decisions to incorporate renewable technology into their buildings, my STS research will focus more on the implementation of different technologies on a larger scale. I will be analyzing the integration of these technologies into society through a wide lens using the *Diffusion of Innovation* theory and a narrower lens using the Theory of Moral Language. Diffusion of innovation looks at the factors that make a technology capable of properly and ethically integrating into society, and moral language analyzes the effect of oratory and literary works on public opinion. I will be interviewing people who work in and around these fields to understand more about the capabilities of these technologies within society and why some are successful and others are not. I will also be using literary and rhetorical analysis to understand the impact of public works on the success of these technologies and their tradeoffs from multiple points of view. I expect to have a more thorough understanding of which trade offs people are currently willing to sacrifice

for a more sustainable future, and how we can overcome or mitigate others to integrate these technologies into society. With both my technological research and my STS research in concert, I hope to improve people's abilities to understand our path to net zero – in terms of their own decisions as well as the ripple effects they have on society.