

Alexander Ton

May 12, 2023

STS 4600

Socio-technical Synthesis: Blue Hydrogen and the Deepwater Horizon oil spill

My technical work and STS research are both related to the energy sector. The energy sector is crucial to our existence and way of life but also poses a threat because of how we currently derive it and the emissions that come from it. Understanding the energy transition is key to developing a clean and renewable future and reducing greenhouse emissions and climate change. The technical portion, a design of a blue hydrogen plant, focuses on current and future technology being developed to meet our energy needs cleanly and economically. This technology and its implantation would bridge the gap between fossil fuel usage and a completely renewable energy future. My STS research analyzes an incident where social factors led to the collapse of an engineering system. While my technical work focuses on developing new technology, my research focuses on past failures and emphasizes the importance of a responsible social component to engineering.

My technical work designs a blue hydrogen production plant meant to convert natural gas into hydrogen fuel with a reduced carbon footprint. Using natural gas for hydrogen production is not novel, but typically has a significant carbon footprint. While hydrogen fuel usage is considered clean, this current method releases large amounts of greenhouse gasses. This technology is known as gray hydrogen. Our team worked on blue hydrogen because of its decreased carbon footprint which is accomplished by adding carbon capture systems. Implementation of this technology would allow a cleaner transition from fossil fuels to a world

completely fueled by renewable energy. Our plant also uses a novel technology called an Auto Thermal Reactor which decreases the power requirement of the plant making it more green.

My STS research investigates the Deepwater Horizon oil spill and BP's role in the disaster. Rather than looking toward the future, my research investigates past incidents and failures. In addition, it investigates the relationship between humans, organizations, resources, and engineering technology. My claim is that BP failed to act ethically by improperly forming a network between these systems that ended up failing and resulting in the Macondo blowout and subsequent Deepwater Horizon oil spill. The goal of my research is to understand how BP was able to abuse its power and how this translated into an engineering failure and environmental disaster.

By conducting research alongside my technical work I was able to better understand both projects more deeply. My social research made me think about the implications of the work I was doing in a motivating way and gave me a questioning attitude. I was motivated to work harder on my technical project knowing that my work could potentially lead to a world where a situation like the oil spill could never happen. It also gave me a questioning attitude as I realized there is so much more to the project than just the engineering principles and technical work. Without socially responsible management, engineering excellence can easily fail and hurt others. Additionally, my technical work influenced my research by helping me to understand the technical implications of the Deepwater Horizon disaster. Both my technical work and my STS research have helped me learn more about the energy sector. I appreciate the knowledge it has given me in terms of understanding the technological implications of our future as well as the importance of social responsibility in managing engineering.