UnEssay Statement: *Micromanager*
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Climate change is both caused by and impacting our power grid. On one front, the manner in which power is generated and distributed directly impacts our greenhouse gas emissions, lessening or worsening anthropogenic climate change depending on the choices made. As of 2021, about a quarter of American carbon emissions come directly from the energy sector (Seevers & Slesinski, 2021), meaning there is huge potential for improvement. On the other side, extreme weather events and changing climate patterns present new challenges for keeping energy affordable, maintaining infrastructure, and preventing power outages. For example, one study found that extreme weather events (like heat waves and severe storms) increased power outages in the US by 67% from 2000 to 2019 (Seevers & Slesinski, 2021). And it isn't just heat: while overall global temperatures rise dangerously, the United States must prepare for the possibility that disruptions in air currents could cause harsher winters as well (Seevers & Slesinski, 2021).

What are microgrids, and where do they come in? Simply put, a microgrid is just a small power grid. It takes on all of the ordinary duties of a normal power grid (first and foremost, delivering power to homes and buildings) on a more local scale, ranging from a few homes to an entire town or city (Schnitzer et al., 2014). These microgrids can either exist as 'electrical islands' in off-grid rural locations, or as components in a broadly connected grid (Landrum, 2015). Electrical islands have already been a vital tool in quickly and effectively bringing power to rural communities in developing nations for the first time (Heap and Hirmer, 2020), while on-network microgrids get the benefits of small grids (local control, less dependence on faraway infrastructure) and large ones (multiple sources of power, economies of scale). These benefits make microgrids a clearly beneficial technological solution to many of today's electricity and climate problems (Seevers & Slesinski, 2021).

Overall, microgrids improve resilience, increase responsiveness to local needs, and enable a faster and smoother transition to renewable energy (Schnitzer et al., 2014). In particular, the potential for climate action through microgrids is worth delving into. The majority of all power generated in the US is lost in transmission, in particular due to old infrastructure and long distances of transmission (Sewalk et al., 2016), an issue that microgrids would be well-equipped to account for. However, these grids are complex undertakings, facing initial regulatory and cost burdens (Landrum, 2015) and losing some economic and management benefits available to larger grids, in the same way that all small businesses encounter challenges while competing with large chains. Additionally, no one solution can solve every issue in the realms of climate change and power generation and distribution; energy efficiency, renewable power generation, and infrastructure upgrades are all necessary to maximize the benefits of microgrids (Sewalk et al., 2016).

My UnEssay project is Micromanager, a game that guides a player through challenges and opportunities presented with running a microgrid. The player, in the role of a newly hired grid manager, is tasked with making hard decisions about the grid over the course of 12 months;

they have to weigh energy costs against climate goals, competing interest groups' demands against each other, and short-term savings against long-term resilience. They will face a new scenario each month ranging from a natural disaster to a newly passed local law to a decrease in the price of non-renewable energy, and their decisions will impact running scores on their climate friendliness, consumer happiness, and satisfaction among government and interest groups. At the end, they will receive final scores in all three categories, and (hopefully) have their contract extended to continue managing the grid.

My rationale for delivering information as a game is simple: **people learn by doing**. Climate change as a whole, and relevant sub-topics such as power grids and energy transmission, can seem totally abstract to many people. Most people don't want to sit down and read academic papers discussing the ins and outs of long-distance energy transmission, parse explanations of advanced computer-simulated global climate models, or weigh the costs and benefits of complex policy proposals on the local or national level. Unlike reading heavy academic materials, playing a game is an enjoyable experience. By connecting the game's central premise (making hard decisions about a local power grid) with real climate change challenges facing the world, the player gets the best of both worlds: a fun experience and a learning experience.

I have programmed this project in the Java programming language. I have designed it as an entirely text-based game that interfaces with the user through the command line or terminal. This choice has allowed me to forgo graphic design considerations entirely and focus on the content and storyline. It also means that, once packaged for download, it will be simple to run on computers of all operating systems. In the future, I hope to make it accessible to those who do not have Java downloaded on their computer; this could entail either packaging the Java language into the download, or rewriting the code in JavaScript so users could play the game in their web browsers with a simple, text-based web page serving as the interface.

References

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