Solarpunk Futures: Illustrating the Future of Solar – Supporting Document

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Climate change is undeniably an important issue for humanity. For several decades the potential for the human-caused increase in the greenhouse effect from the burning of fossil fuels has been known; despite this, efforts to combat this consequence of industrialized society have met considerable resistance (C-SPAN, 1969). Either way, the impact on Earth's climate is observed in places like the polar ice, sea levels rising, global weather patterns becoming increasingly erratic, etc. There have been several alternative energy-generating technologies that are being utilized to help alleviate societies' dependence on fossil fuels. One such technology is photovoltaic cells, more commonly known as solar panels. This technology may not be as new as some believe, the first successful cells were created as early as 1954, with the theory supporting their creation being considerably older (APS News, 2009). As photoelectric technology has matured, efficiencies and manufacturability have increased, and cost has reduced (Desai et al., 2021).

The Solar Energy Technology Office (SETO) has been a major force in helping accelerate the development of new solar technologies as well as advance current panel performance. In general, solar panels use semiconductors, which when exposed to solar radiation, absorb energy from the photons. As a consequence, excited electrons from the materials are ejected and collected by surrounding conductors in the system. Currently, most panels are manufactured from crystalline silicon wafers that are engineered to act as diodes, so that any induced current can only flow in one direction (SETO, 2019a). One increasingly popular alternative to crystalline silicon is thin-film technology, mostly due to it being easier and less costly to manufacture. The downside to this methodology is that the conversion efficiency is generally less. Some emerging technologies in this field (that SETO is involved in as well) are

perovskite, quantum dots, and organic photovoltaics. Another emerging method for increasing the output of solar arrays is “multijunction” cells (SETO, 2019b). These operate by using several layers of semiconductors that extract energy from different wavelengths of the electromagnetic spectrum.

Overall, to combat climate change solar technology is essential to consider as part of the solution. It is flexible, as it only requires sunlight, and has the ability to scale up to whatever needs it must supply. In addition, as manufacturing becomes easier, and the efficiency of the panels increases, the cost of the solar panels is decreasing (Desai et al., 2021). Furthermore, offices like SETO are continually investing in newer technologies that can be applied to solar energy harvesting to help make the source of energy even more viable.

Art Concept

Of course, it is difficult to convey specific technological information using a purely instrumental piece; even so, this was my chosen media for the project. As such, a large part of the concept for the project was based on the Solarpunk aesthetic (Gossett, 2023). I was not aware of this genre upon beginning this project, but I was quite familiar with many of the other “punk” sci-fi sub-genres. For me, a lot of sci-fi, and especially these sub-genres are represented by a synthwave style of music/instrumentation (especially cyberpunk). Following that, a natural sound in my mind is represented by classical music. From there, it felt the way to go, considering Solarpunk as a fusion of technology and nature, was the find a way to fuse the sound of classical music with synthwave (Gossett, 2023). Due to the prefix “solar” and the overall focus on sunlight (from solar panels), for the classical half, I leaned toward a baroque sound. For whatever reason, when I think of music representing the sun, I tend toward a towering pipe organ and the massive chambers of a Gothic cathedral, with the bright sun piercing through the massive

stained-glass windows. From there, the baroque sound was built around the pipe organ base. For the synthwave sound, I was less particular, except that I wanted to introduce a growl in the bass intermittently.

At first, I envisioned a struggle between the classical (from now on natural) and synthwave (from now on technology). In this case, I had wanted some dissonance between the two, with the technology sounding sinister. I also pictured the overall musical form being a passacaglia in the key C minor (the choice was likely subconsciously inspired by Bach's Passacaglia and Fugue in C minor). Yet, this vision of the struggle did not fully come to pass. Although I did write in a "struggle" of sorts, it became more of a shift of attention to a different motif, where the first one did not want to let go. Also, the technology did not become sinister, just a variation on the natural. Looking back, I believe this development works better for the tenets of Solarpunk ideology. Part of the Solarpunk future is the integration of the natural and the technological, and it makes sense that to reach a world in that state, one would need a balanced view of both (Gossett, 2023). Thus, my music evolved to represent the beauty of both the natural and the technological. Although, the unnatural and "sinister" part of the music, I think, it is still somewhat captured by the growl in the deep. This growl terminates both the natural and technological themes. Following one of these is a small period of silence that then begins anew with pizzicato strings performing the ostinato that has permeated the piece. Slowly, a simulated pizzicato with the synthwave starts to come in, however, it is syncopated with the strings at first. Over a couple of phrases, it moves into sync.

Going back to the big-picture concept, in my mind, this piece would be divided into two main sections: pre-Solarpunk and post-Solarpunk. The before would feature the natural and technological separately, and then maybe include the transition to the second section, which is

the Solarpunk future: natural and technological fused harmoniously. As mentioned previously, for an all-instrumental piece, it was hard for me to clearly demonstrate solar technology and funding. One instance that I made a strong attempt was at the transition period. The alternating pizzicatos were inspired by the photoelectric effect. The plucked strings were the photons striking the panel, and the synthwave was the electron being ejected (SETO, 2019a). As they moved into phase, this represents the increased capabilities of solar panel technology, which continues to advance through SETO research and funding. Another potential use is that some sort of visual media for communicating photovoltaic technology and SETO funding could be used in conjunction with this audio.

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