Hot Sand Thermoelectric Battery

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As global reliance on fossil fuels exacerbates climate change, the search for a sustainable and clean energy storage solution has become increasingly critical. Most "clean energy solutions" rely on lithium-ion batteries. These batteries are not only expensive, but also the mining and disposal processes raise concerns including slave labor, mining fossil fuel emissions, and toxic contaminants that leach into the ecosystems. This project introduces the Hot Sand Thermoelectric Battery-- a groundbreaking project leveraging sand's low heat transfer ratio and high thermal storage capacity to store and convert energy efficiently. By employing thermopiles to transform heat stored in sand into electricity, our fifth prototype demonstrated the potential of this technology. It achieved 19.4 total volts from a system designed around common materials. While working on this project, we have constructed and tested 5 individual prototypes, with a 6th design in progress. We have learned that the amount and quality of thermopiles, quality of soldering, and temperature difference between thermopiles greatly affect the results. Our future design will incorporate cells, each consisting of a thermopile sandwiched between hot sand and a cold source. These cells will be connected into a series circuit. This design has the potential to be even more efficient. On a larger scale, the Hot Sand Thermoelectric Battery could replace lithium-ion batteries everywhere, from solar fields to charging electric cars. This will lead to a clean future where people don't have to sacrifice their wallets and morals for clean energy.

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