The Thermoelectric Generator Using Hot Sand

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In today's day and age, our world has been plunged into an energy crisis. Current clean energy solutions rely on lithium-ion batteries made with cobalt and lithium. These minerals are problematic because they are expensive, dangerous, damaging to the environment, and linked to child labor. Our solution is The Thermoelectric Generator Using Hot Sand. This design utilizes sand's low heat transfer ratio to allow it to store thermal energy cheaply and easily. When thermocouples are exposed to a temperature difference between hot sand and colder surroundings, they can generate electricity using the Seebeck effect. In our testing of 6 previous prototypes, we could store electricity for 24 hours and produce 20 volts using an electrical heater and ice. After 50 hours of testing our 7th prototype, we were able to find that our current design needed only the power of the sun and the cool Earth beneath to generate more than 50 Watts of electricity for 30 minutes, reaching 73% of its calculated maximum output. After the sunset, the box could still generate a usable amount of electricity for 2 hours. Our future focus will be to increase our calculated maximum potential power output as well as have our new prototype have more than 73% of its maximum power output. To do this, we plan on increasing the volume of the box, integrating the prototype into a microgrid, and increasing the insulation on the design. This is all with the goal in mind to develop a prototype that is cost-effective, environmentally friendly, and efficient.

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