**SOLAR VOLCANOES**

 **Concept Narrative:**

The *solar volcanoes* project blends renewable energy with community-driven design in Marou village, Fiji. Three modular, cylindrical structures are arranged around an open space, symbolically reflecting the Southern Cross constellation, a significant cultural symbol in Fijian heritage. When lit at night, these structures will mirror the constellation, connecting past and future.

Each *solar volcano* is equipped with shape memory alloys (SMAs) that adjust the angle of the solar panels to track the sun, optimizing energy production throughout the day. The elevated design allows for user access and water management beneath the structures, where stormwater from the mountains is diverted into a treatment system. The water is filtered and stored in cisterns, with a capacity of 500,000 liters, ensuring a reliable water source for the village during dry seasons. Two distribution stations, located on the east and west sides of the village, provide access to clean water.

One *solar volcano* will house a community gathering space, fostering social interaction, while the other two will be dedicated to housing drinking water treatment technology.

**Technical Narrative:**

The *solar volcanoes* use advanced SMA technology to optimize solar energy capture. As the sun moves, the SMAs cause the cylindrical structures to tilt, maximizing the surface area of the solar panels. This increases energy efficiency compared to traditional, fixed solar panel systems.

Water is diverted from existing stormwater channels in the mountains behind the structures and directed through visible troughs along the *solar volcanoes*. The water flows into a settling pond, followed by a drinking water treatment process, ensuring safe potable water. The treated water is stored in cisterns with a capacity of 500,000 liters, which can be distributed through two stations within the village.

**Prototyping and Pilot Implementation Statement:**

A pilot will be implemented with three modular *solar volcanoes* in Marou village to test the integration of solar energy and water treatment systems. A prototype will first be created to ensure the SMA components and water management features work efficiently in the local climate. After the initial prototype, the structures will be monitored to assess energy production, water storage, and community usage, with adjustments made based on feedback from the village.

**Operations and Maintenance Statement:**

The *solar volcanoes* will require minimal maintenance. The solar panels and SMAs are designed for durability, with regular checks to ensure optimal functionality. The water management system will be monitored, with regular testing of water quality to ensure it meets safety standards. Local residents will be trained to maintain the structures and conduct basic repairs, ensuring long-term sustainability.

**Environmental Impact Assessment:**

The *solar volcanoes* are designed to have a positive environmental impact by reducing reliance on fossil fuels and improving water security. The elevated design preserves local ecosystems and allows natural water flow. The stormwater treatment process mitigates flood risks while providing clean water during dry seasons. Additionally, the integration of solar energy and water management minimizes the environmental footprint, supporting both sustainability and resilience for the community.