## **REUSE AS REIMAGINATION**

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As Earth grows more populous and humanity's demand for resources increases beyond its capacity to give, what once appeared limitless now seems finite. Forests, prairies, and oceans that were vast and unexplored are now logged, burned, and overfished. Our survival as our impact expands will depend on our ability to more efficiently and effectively use the resources that are all around us. Island communities have long offered perspectives into more harmonious, less resource intensive ways of living. In these geographies, the land never seemed infinite. Driven by the constraints of having less, these communities have invented countless ways of doing much with little.

Our LAGI 2025 Fiji submission showcases the innovative mindset these communities embody. Our submission emphasizes the reuse of components, such as second-life PV solar panels, to demonstrate the inventiveness of people in communities like Marou Village in deriving value from materials and technologies that other cultures discard. The system design incorporates multiple sources of energy generation with appropriately-sized energy storage in such a way that offers other benefits to the community, such as storage of water for dry seasons and a shaded space below the solar array for the villagers to use the land for agriculture or recreation. The system design incorporates three major aspects: generation, storage, and usage.

Most of the electricity is generated by a 75kw solar photovoltaic array built within the boundaries of the site outlined in the project materials. This solar array is built from four hundred solar panels that have been previously used in the United States and are refurbished for a second life generating electricity for Marou Village. These panels are arranged in groupings of ten to twenty on pavilions modeled roughly after the traditional Fijian bure. These pavilions are constructed as much as possible from locally sourced materials including palm wood and bamboo for the thatched roofs. The shaded area underneath the pavilions is left open and accessible to meet community needs, offering space for agriculture, community meeting, or play. Half of the pavilions are arranged to the north-east to generate more power from the morning sun, requiring less energy storage to meet the energy demands of the typical morning in Marou.

Energy storage is handled by two technologies - pumped hydroelectric and chemical batteries. As over half of Fiji's electricity is currently generated from hydroelectricity, we felt that a small hydro system would be a great way to leverage knowledge in a technology many Fijians may already be familiar with. The needs of both energy and water storage are met by a pumped hydroelectric system that sends water to an upper reservoir during periods of excess solar generation and drains that water to a lower reservoir to create electricity when the sun is not shining. This system revitalizes the old dam infrastructure already in place on the island and will store water for the region's dry season. These reservoirs send water through a filtration system to supply the village. Energy storage capacity is supplemented by lithium-iron-phosphate (LFP) batteries, whose modularity enables easy expansion of the system if necessary.



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Our system design powers all requested uses, from device charging and lighting to cold storage, irrigation and cooking, incorporating specific features as necessary to enable their use at lower energy consumption.

For instance, the sun can directly heat water using solar thermal technology, while cold storage units can be insulated using local materials such as coconut fiber and set in cellars to reduce the temperature gradient.

In this way, our system showcases efficient technologies that allow the villagers to power the experiences they want while minimizing the need for additional power generation. This approach keeps the system more affordable, smaller, and easier to install.