**LAGI 2025 Fiji Narrative -- MAROU TOTEM LANDSCAPE**

**1. Concept Narrative**

* Design concept

The **Marou Totem Landscape** is conceived as a collaboration with the people of Marou: a blend of local techniques developed from locally sourced natural materials and a contemporary design that creates a light-touch landscape of sun and water collecting “Marou totems.”

The landscape is composed of modular tree-like totems as replicable structures that honor the cultural identity of the community and its unique surroundings while providing reliable electricity and clean drinking water to the village of Marou households.

The ‘germinating’ totem unit is composed of a structural column made from a timber hexagonal frame and bamboo, a rapidly growing renewable material local to Fiji called bitu dina. The vertical tree-like structure supports a canopy made from planter baskets (woven as locals do for the Lovo basket) that act as a first filter for the water that is collected from the solar panels during rainy seasons. This canopy also supports the solar panel system,

The Totem is inspired by the Rain Tree (Samanea saman), which naturally filters water as it moves through it and down to the ‘root’ system. Much like trees, Marou Totems filter water as it moves through the layers of the structure, benefiting water quality and purifying it to drinking capacity. It also connects to the water tank/ cistern system.

MAROU TOTEM LANDSCAPE is designed as a modular system depending on the necessity, the project scale, and the available budget. Shown in the drawings is an intervention that aims to tread lightly: its shape is determined by a strategy that works around existing trees, to not have to remove any.

There is enough space on the site to triple the size of what is currently shown and calculated.

* visitor and community experience, co-benefits, shared land uses, and any other important aspects of your design.

Our proposal provides sheltered space for community events and special programs that can benefit residents and visitors as well. The variety of covered and uncovered spaces created by the canopies fosters flexible and adaptable spaces for community events and activities both collective and individual. The terraced steps along with benches and various ground cover surfaces foster different ways to gather and meet.

**2.Technical Narrative**

* What technologies does your design incorporate? Why did you choose them?

SOLAR PANEL SYSTEM:

While most common configurations use cells arranged in a panel of 60 or 72 cells, we aimed to make it more manageable, as the transportation of larger units is more carbon intensive. The proposal uses a 30-cell panel, smaller scale for ease of transport and manipulation. While larger panels generally offer higher power output, there are practical limitations to their size. Overly large panels can become unwieldy and difficult to handle during installation and maintenance. We have opted to use smaller panels for the ease of transport, installation and manipulation. They provide the same energy as a large panel and are connected together in parallel to output the same amount.

We propose that the panels can be rotated as needed. In the drawings the panels might be shown oriented in different directions, but this is to show that the panels can be rotated and adjusted for the different seasons, however they would be all rotated equally to the most optimal angle, which ranges between 16-19 degrees depending on the season.

Power from the panels is gathered by tree cluster and parsed through a solar controller at one of the tree elements. From there power continues to a series of battery storage banks located in adjancent bench storage. An inverter is also integrated into this storage and converts the stored power into AC power that can be serve domestic needs. For dc power, it is available from the controller directly and can be routed to serve both exterior lighting fixtures that run on dc power as well as domestic appliances that also need dc power.

WATER FILTERING AND COLLECTING SYSTEM:

the water totem mimics the Earth’s own filtration system, using natural materials and processes to purify water, while also incorporating local knowledge of Marou village residents for its design and fabrication. These are the multi-phased filters proposed:

First, planter basket filter which acts as a nutrient filter. As the rain water falls from the solar panels into the planters, (used to grow herbs and spices for use in cooking) it travels through the plant nutrients down to the planter lining, the second filter. This is incorporating local knowhow use of coconut coir fibres.

Second, cocopeat bio filter, or peat filter: as water passes through the coconut coir fibre that lines the planter structure made from loosely woven palm leaf. This is incorporating local knowhow: lovo basket weaving for traditional cooking

A lovo is the most traditional form of cooking by the iTaukei Fijian people, so it is knowledge that has been passed down. The project would like to celebrate this knowledge by incorporating it to the structure as the canopy system.

The palm leaf at the base of the canopy has a carbon filter, and is made from a tight woven palm leaf structure, the water is directed into a funnel with a carbon filter.

The local knowhow is craft and rug weaving. The base of the totem provides a filtered water faucet, for direct water access. At the base is the ceramic water purification & faucet: a a system of interlocking ceramic vases, locally made with native clay, further filters the water into a purified quality ready for drinking

* How much energy and water does your installation generate each year?

Any excess water can travel to the system of interconnected cisterns, using gravity and simple trench system under a compacted soil surface.

The structure filters and estimate of 2.3 million litres per year.

This water collection developed is one phase of the project that is able to provide 1/3 of the residents’ needs in water. There is space on the site to triple the proposal, which would cover 100% of the resident’s needs.

Any excess water can travel to the system of interconnected cisterns, using gravity and simple trench system under a compacted soil surface.

The structure filters and estimate of 2.3 million litres per year.

-solar energy collection:

One gathering totem produces:

**5.06 kWh/day**

**1,579.87** **kWh/year**

The complete solar panel system produces:

**334.12 kWh/day**.

**104,271.52** **kWh/year**.

CALCULATIONS FOR A SINGLE GATHERING TOTEM:

Tree uses 9 panels, each with a 150W rating.

System Wattage: 9 panels \* 150W/panel = 1350W

Daily Production: 1350 W \* 5 kWh/m²/day \* 0.75 = 5,062.5 Wh/day = 5.0625 kWh/day.

Annual Production: 5.0625 kWh/day. \* 365 days/year = 1,847.81 kWh/year.

Adjusting for Losses: 1,847.81 kWh/year. \* 0.90 (system loss) \* 0.95 (degradation) ≈ 1,579.87 kWh/year.

Therefore, the estimated annual solar panel production for this example would be approximately **1,579.87** **kWh/year**.

CALCULATIONS FOR OVERALL SYSTEM:

System uses 594 panels, each with a 150W rating.

System Wattage: 594 panels \* 100W/panel = 89,100 W

Daily Production: 89,100 W \* 5 kWh/m²/day \* 0.75 = 334,125 Wh/day = 334.12 kWh/day.

Annual Production: 334.12 kWh/day. \* 365 days/year = 121,955 kWh/year.

Adjusting for Losses: 121,955 kWh/year. \* 0.90 (system loss) \* 0.95 (degradation) ≈ 104,271.52 kWh/year.

Therefore, the estimated annual solar panel production for this example would be approximately **104,271.52** **kWh/year**.

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Assuming:

The average daily insolation in Fiji is 5 kWh/m²/day.

System efficiency is 75%.

System losses are 10%.

Efficiency degradation is 0.5% per year.

1. **Prototyping and Pilot Implementation Statement**
* How will your team approach the prototyping process and full-scale pilot implementation process and how will you collaborate with local community in both of those efforts?

As the project is intended to be a codesigned, the first step would ideally be to get feedback from the local community regarding the elements o the structure that are inspired by their traditional uses of materials and crafts.

We would first mock-up at a small scale and continue the material testing we have been doing, including the ceramic filters and other natural filter techniques. The ne we would work on the structural integrity and capacity, of the unit, as in the proposal it relies on being tied together into a rigid structure.

Then we could build a scaled prototype integrating solar panel.

1. **Operations and Maintenance Statement**
* How will your design be operated and maintained during its life? How will the local community contribute to operations and maintenance?

Since all the elements are made from local sources and techniques that the community currently already uses, it is though from the local community that this can be properly maintained. We hope that the villagers see this as their project, as we think it should be a co-design.

**5. Environmental Impact Assessment**

* What effects might your installation have on natural ecosystems and what steps can be taken to mitigate any foreseeable issues?

CARBON EMISSION FROM CONSTRUCTION

The project minimizes carbon emissions by using materials and construction methods that have very low embodied carbon.

WASTE GENERATION AND POLLUTION

The project uses local building materials and works with component sizes such that large means of transport are not needed, further minimizing carbon emissions and disruption to the landscape.

HABITAT LOSS AND ECOSYSTEM DISRUPTION

The project has a light touch on the ground and provides for possible new habitat integration through the canopy and plantings in and around the project site. The project is a multispecies project, that aims to accommodate all inhabitants, human, flora and fauna of Marou Village.