SOLAR FRAME
Fiji's Community-Based Solar Hub Links People, Land, and Sky

01 Concept Narrative: Framing the Community

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

The *Solar Frame* offers itself as an ever-evolving community-based art and technology center for solar design. It will be a national and regional treasure, as *Fiji's Community-Based Solar Hub*. It is designed for performance—to capture solar power and water on site—while providing a beautiful backdrop for community-building around solar design and local creativity. The open-air structures allow for a growing tapestry of diverse solar panel design, including Monocrystalline silicon.

The structure's raised podiums and open plans provide flexible frameworks for performances—from theater to music events—and serve as a site for all villagers and visitors to engage the creative culture of Marou and its community-oriented practices related to cutting-edge solar technologies.

A central volume is dedicated to workshopping and community gathering around solar design and culture. The western volume contains restrooms and storage for furniture and other on-site objects. The volume to the east contains a mini grid overseen by the Fiji Department of Energy and its associates.

We believe it is important for Marou to be continually engaged with resources from all around the world as solar technologies evolve and transform. This project allows villagers to become knowledgeable—even experts—with opportunities to develop skills around solar technologies. Residents would gain first-hand knowledge of solar technologies that range in efficiencies, ease of use, maintenance, DIY receptiveness, potential for greater creativity, and aesthetics, among other things. Residents could collaborate with researchers and developers well beyond the construction process, receiving new and emergent solar panels/technologies on an on-going basis that become part of the *Solar Frame* envelope. New technologies coupled with tried-and-true solar products create a beautiful ever-evolving tapestry of different solar technologies that range in opacities, transparencies, color, and use. We believe people across Fiji and the world will continually seek out the Workshop's expertise because of its community-based approach to solar technologies—both existing and emergent. Marou could host researchers and eco-tourists. There would be economic development opportunities around this community-based technological and cultural framework with its ever-evolving solar knowledge practices.

Marou's opportunity to be part of an international solar design network, coupled with the kinds of community-engagement, workshops, and knowledge creation around the *Solar Frame* will be profound because of the intimate size of the village. All villagers will have an opportunity for a direct relationship with this solar project. Marou's first-hand knowledge and insights into human-centered solar resource development would be invaluable to how solar technologies might be developed in community-facing solar projects across the globe, as most solar arrays do not engage with human experiential design, and few further ecological practices.

The site south of the new structure would continue to be dedicated to agricultural and other community-based uses—determined by residents. Water captured on-site, via a large cistern below the new structure could be used on-site and across the island.

02 Technical Narrative

How much energy and water does your installation generate each year? What are the system inputs? What are the system outputs?

Because our final prototype will be developed after consulting Marou residents and the project team, approximations will be made later. We would like to conceptualize energy-based planning beyond the project site—that might include solar panels for/shared between every household and possible tidal energy generation.

SOLAR

The exact inputs from the solar power/photovoltaic systems will be developed in collaboration with the Fiji Department of Energy/Fiji Rural Electrification that will oversee the design of the electrical distribution system for the mini grid on site. The *shed* east of the main *Solar Frame* workshop will be the energy center, the site to convert sunlight into direct current.

The efficiency of the solar panels is based on real-time temperatures and the intensity of light, which change over time. Sensors will monitor both. We propose various input systems related to battery charging and possible grid connections.

The solar power outputs would provide AC electricity and battery-stored energy (DC > AC electricity would require an inverter); monitoring (of efficiencies; inputs/outputs and use), as well as excess heat (that could potentially be harnessed for other purposes). Additionally, if Fiji hopes to develop a more expansive grid system, synchronization could be brainstormed. More immediately, excess energy could be stored in batteries.

WATER

Water inputs include capture panels on the *roof* for rainwater harvesting, as well as ground water collection via the sloped site into the cistern below the structure. As for outputs, if the

cistern is full, it will be diverted to a storage or drainage system via a control valve. The collection system will include a pump, optionally powered by solar energy; and a valve release that can be controlled by hand. The water level would be monitored, as well as tested for contaminants on a regular basis. The water might be treated with UV or chemicals to ensure safety. Additionally, temperature, humidity, extreme weather, and pollutants (such as pollen) will be monitored, since they impact the water system maintenance and supply.

03 Prototyping and Pilot Implementation

How will your team approach the prototyping process and full-scale pilot implementation process? How will you collaborate with local community in both of those efforts?

If selected, we would immediately engage project organizers and Marou residents via Zoom and other online platforms. We can seek some immediate funding from our institutions (as we are artists/designers active in university teaching and research) for honorariums for translators and other purposes. We want to hear firsthand how to meet the goals of the community; and then establish a collaborative mission and work towards that. In other sessions, we would like to host workshops for the entire village, so that everyone has a stake in the project and its success and meaning. Collectively we would develop the next steps with a timeline to mobilize resources in Marou and beyond. These resources include producers that the organizers might have direct relationship (for example, Crystal Island Fiji), and production pathways with solar experts, engineers, researchers, and manufacturers. We are in a manufacturing region with many experts to collaborate with on the *Solar Frame.* They would bring additional and broad-ranging expertise to the project. We would facilitate conversations between Marou's makers/experts and our local experts (including hydrologists, material scientists, and civil, structural, and electrical engineers). We would like to work in deep collaboration with the team overseeing the construction and maintenance of the project. We will also visit Marou during planning stages and hope to be in residence during its construction.

We will prototype locally near our studio, as we are based in a fabrication center/region with great expertise in metals, electrical, and machined parts. We would collaborate on a delivery method for the full-scale project, utilize existing expertise in Marou and Fiji, and would like to see the construction and maintenance bring jobs and economic development to Marou. We would also like to establish relationships with Makerspaces in nearby regions.

We hope to engage Marou residents for years and decades to come, as we are inspired by this pilot program that serves the whole planet and all humanity.

04 Operations and Maintenance

How will your design be operated and maintained during its life? How will the local community contribute to operations and maintenance?

Together we would develop a maintenance plan. The very success of the project depends on it. Civic and community-oriented projects fail without maintenance and well-developed strategies that ensure the long-term success of a project. Such projects need continued care and resources. We are delighted that the Department of Energy has strategized a tariff for solar panel maintenance.

Solar Frame activities would largely be funded through eco-tourism developed through workshops at the site and in the community, which would be at the forefront of human-centered design for such projects; and monetary support would also be sought through ongoing partnerships with manufacturers/design researchers that would (hopefully) supply and work collaboratively on an ever-evolving mosaic of solar panels installed at the *Solar Frame*.

This project is planned to be developed over time. The *sheds* are open-air, and solar panels are affixed to the structure's roof and sides. Solar technologies can also be designed as integral components of the site furniture, walls, and floor systems, as the project progresses.

This project conceptualizes lifecycles and recognizes that solar panels last for roughly 25-30 years. The entire planet will be grappling with how to recycle solar panel *waste* in years to come. Japan is at the forefront of such recycling. We would work to establish relationships with organizations who not only supply and collaborate with citizens of Marou on future solar panel design, but also with solar panel recycling. In other words, together we will establish processes for acquiring and positioning new panels; and processes for removing solar panels, which become *solar waste* and later translate into new solar products through material harvesting. In doing this, we will be imagining new kinds of jobs and training in the community, for villagers, which will be transferable and needed by nearby and distant communities. They will be equipped with knowledge of how to install solar panels, how to maintain solar technologies, how to facilitate community-building around such projects, and how/where to recycle solar panels. This means villagers will be connected to and ushering in a new kind of community-building in Fiji and beyond, around such care practices; and will be in direct contact with expert solar researchers, manufacturers, policymakers, recycling facilities, and networks of suppliers/shippers and eco-oriented citizens.

05 Environmental Impact Assessment

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

Our practice straddles art, architecture, landscape, and furniture design, among other spatial disciplines. Our design for the *Solar Frame* celebrates the landscape through terracing and its construction would work to mitigate and avoid risk to Marou's natural ecosystems. We are trained in environmental design and impact, and throughout the project's prototyping and ultimate design/construction, we would be following best practices, which include utilizing renewable energy sources and as many local materials as possible; incorporating local building practices; reducing construction waste and the construction footprint; including environmental monitoring in the design of the project; creating a lighting strategy that avoids light pollution; developing a landscape/site strategy that celebrates local plant life and habitats and avoids soil erosion; developing long-term maintenance goals that establishes environmental protection as integral to the project and limits/strategizes future such developments with Marou residents; and incorporates lifecycle and circulatory design cycles, including ever-evolving project goals and benchmarks in collaboration with community members. Making this project viable means ensuring the project is meaningful and productive for current and future generations of Marou.