**LAGI House of Energy and Marou Gardens**

**Complementary Material**

***Concept Narrative:***

The LAGI House of Energy and Marou Gardens are an interconnected energy system designed to provide plentiful solar energy from a photovoltaic solar system; a system for harvesting rainwater, storing it and having it available; a landscaped garden with selected plants that represent the culture and the heritage of the village; and a central construction, the “LAGI House of Energy,” that provides a number of services and functional spaces for the people of Marou.

The LAGI House of Energy and Marou Gardens are designed to complement the natural beauty of the landscape without obstructing it. The balance has been mostly inclined in favor of unspoiled surroundings, and against constructed spaces. Marou is located in a natural paradise. The ocean, the tropical vegetation and the rugged landscape are its main attractions. The people of Marou have been wise to preserve this natural location in such excellent conditions. Their guidance will be essential to preserve the biocultural assets of their community.

The cost of sustainable development has to balance the high value of quality structures that will be easy to maintain, making the most of the precious resources that are assigned, and creating the highest positive impact over time. This is the main reasons that we have picked a concrete structure with a concrete roof for the construction. The cost to bring masonry material to the island may seem high at first, but what other structure will serve as a reliable shelter for the people of Marou during a dangerous storm?

The LAGI House of Energy is a centerpiece asset for the Village of Marou. A high quality construction that can be used for community meetings or celebrations. The creativity of the people of Marou will power the possibilities; it can be used for classes, exercise space, internet equipment, or a public library. It also includes a community kitchen, a community freezer room, a water desalinization room, and climatized meeting areas.

The Marou Gardens are born from the knowledge of the people of Marou of their land and their natural landscape. The gardens are made to admire the landscape, and to learn about the culture, plants and trees of the island. They are crafted to provide shade and enjoyment for locals and visitors alike; a community project that produces an artistic statement of color and energy.

All of the elements and materials that have been included in the construction of the project are readily available in the market at competitive prices. To provide quality services for the people of Marou, the design has been adjusted to obtain maximum usage over a long period of time, with the lowest cost of maintenance.

The LAGI House of Energy and Marou Gardens are designed to be expandable in the future as further needs surge in the community. Additional panels can be added to improve energy output, or the community garden can be expanded to include new plants. The project is a Land Art living installation of endless possibilities for the people of Marou.

***Technical Narrative:***

The Solar Energy System for Marou Village has been designed to produce plentiful energy from the tropical sun for all the residents of Marou. Excess energy from peak times of production during the day is used in additional applications like pumping water from the rainwater harvesting system, or operating the water desalinization plant. The photovoltaic solar panels are safely mounted on the roof away from bystanders, and the energy is managed from within the LAGI House of Energy to be used on demand 24 hours a day. The solar energy system is designed to produce an average of 320 kWh per day, and a yearly production of 116 MWh per year.

The rainwater harvest system for Marou captures water in lower water features, and moves it towards higher locations creating a system of controlled watering that fills up the reserves and increases natural water filtration. Water is also stored in different locations by using pumps that are powered during peak energy production of the solar system. The rainwater harvest system for Marou also provides water for the Marou Gardens. Water is captured by land shaping of water features inside the design site by using a medium tractor with a backhoe and a loader. In many tropical locations like Marou, there is abundant rainwater during the rainy season, and large periods of drought during the dry season. Harvesting the largest amount of rainwater possible, and storing it is necessary to manage this precious resource.

The Marou Gardens employ a biodynamic plant management, landscaping and agricultural system. Nutrients and water are continuously cycled through the system to promote plant growth, and to improve the quality of the earth. The community garden offers a great opportunity for learning and participating. Direct interaction with the living processes of the garden adds a unique experiential quality to the land art.

A small flock of sheep of about 15 to 20 animals helps to feed nutrients into the biodynamic cycle of the garden. Cut-grass or pasture is turned into manure, a valuable fertilizer for the garden, and collected daily from the space where they are enclosed at night. This decreases the dependence on imported fertilizers to improve the quality of the soil.

One of the most important assets is the direct involvement by the people of Marou Village in the construction, management and maintenance of all of the energy systems in the LAGI House of Energy and Marou Gardens. Training future management teams will assure operation of the energy systems into the future.

***Concept Project Cost Estimate:***

The estimated cost for a full-scale pilot implementation in Marou Village is $216,400 USD. It has been broken down in the following sections:

$85,000 for solar energy system including inverters, solar panels, structures, cables and batteries.

$74,000 for construction of the LAGI House of Energy and its multipurpose spaces.

$20,000 for transportation, rent and fuel for the tractor for land shaping of the garden and water features.

$18,000 for furnishing of the LAGI House of Energy: freezers, air conditioners, tables, chairs, ceiling fans, storage spaces, projector and audio system, etc.

$10,000 for a desalinization plant for 1000 liters of drinking water per day.

$8,000 for additional equipment like water pumps, hoses, connections, etc.

$1,400 for purchasing sheep, fencing supplies, and related tools.

All of these costs take into account the collaboration and planning by the people of Marou to get the most results from the assigned budget. The estimated costs can also be lowered by seeking out sponsors or other contributors that are interested in seeing the full-scale pilot completed.

***Prototyping and Pilot Implementation Statement:***

The Project Prototype that will be placed in Suva, Fiji will be scaled at 1/6 of the size of the Pilot Project.

A solar array of 15 photovoltaic panels will feed into two 6 Kw inverters, and store energy into four batteries of 5 kWh each. The masonry construction can be roofed with metal to quicken the time of delivery of the prototype.

The tractor with a backhoe and loader for land shaping can be rented for a shorter period of time to create a main water feature and smaller water harvesting zones. A community garden is planted with native species and other species of interest. A tree nursery will prepare the tree collection of tomorrow.

Some water tanks and pumps are installed to show the cycle of water with the aid of excess energy from peak production times by the solar energy system. Water tanks can be replaced for plastic tanks for the prototype, to quicken the time of delivery of the final product.

It would be important for the prototype to have the greatest number of elements from the original design to fully exhibit the multifunctional characteristics of the land art.

For the Pilot Implementation in Marou Village, the knowledge learned during the prototype stage will add important information about resources, prices and possible partnerships with providers to lower costs.

A successful Pilot Implementation of the project in Marou Village is essential for the replication of the project in other locations. The involvement of the people of Marou is crucial for every stage of the design process, the Project Prototype, and the full-scale Pilot Implementation. The LAGI House of Energy and Marou Gardens are designed to provide valuable solutions to improve the quality of life of people in the village, and to make them active players in their management.

***Operations and Maintenance Statement:***

The true energy of Marou are its people and culture. Designing a space where technology and development combine requires a nurturing a close relationship with this energy. We are looking forward to learning, collaborating and constructing the LAGI House of Energy and Marou Gardens with the people of Marou. We want to create a project where beautiful land art is built to fully serve the people of Marou for many years.

The input of the people of Marou is essential to operate and maintain all of the systems in the project. Community participation is a necessity from start to finish. The construction of the LAGI House of Energy and Marou Gardens will need workers and people that can be trained to operate, repair and provide maintenance for the different systems that compose the project. Long-term community involvement is a necessity for slow growing parts of the project like the native tree collection, and for required maintenance of the different systems.

The LAGI House of Energy and Marou Gardens are designed to be expandable in the future as further needs surge in the community. The whole project is a Land Art living installation of endless possibilities for the people of Marou.

***Environmental Impact Assessment:***

There is an environmental cost related to transporting and using a tractor, and there is also an environmental cost related to using concrete and steel to build the LAGI House of Energy. Solar energy also has an environmental cost to produce panels and batteries, and it certainly leaves the print of human activity on the environment. The LAGI House of Energy and Marou Gardens use these technologies because the people of Marou deserve to improve the quality of life in their community.

The disproportionate negative effect of global warming on island communities is fueled by patterns of over consumption in far away locations. Tractors for digging are used everyday in cities around the world. Thousands of stores are built that use larger infrastructure than the LAGI House of Energy. Erosion, lack of water, lack of energy, and severe storms are real problems that deserve permanent solutions and long-lasting structures. The LAGI House of Energy and Marou Gardens are designed to work reliably for decades. They will support the low-impact lifestyle of the people of Marou that has preserved the quality of their ecosystem to this day.

Every effort has been made to avoid using plastic and strong chemicals in the construction process, and in the final structures. The investment in long-lasting structures lowers the overall environmental impact of the project over time.