**Drau

1. CONCEPT**

*Drau* (Fijian forleaf) is a public, modular solar installation inspired by the traditional Polynesian *Masi* patterns and the organic structure of palm leaves. Designed for tropical environments, it provides energy, water and shaded public space that honors local heritage.

Each 3.5 x 3.5 m module features solar panels mounted on an elevated, 19°-tilted square roof, providing protection sun and rain. But Drau is more than just a shelter. The roof’s 45° diagonal rotation enhances airflow and minimizes edge uplift, offering both visual elegance and structural resilience in cyclone-prone climates—without compromising solar efficiency. Additionally, the rotated, diamond-shaped roof facilitates rainwater collection into a shaded water tank, covered with impregnated woven leaf mats. These not only distinguish each module but also celebrate local craftsmanship.

This unique roof shape allows grouping three modules into a fan-like formation, with panels oriented to the north, east, and west to maximize solar exposure throughout the day. Compared to the one direction strategy, the mixed orientation offers more stable energy flow, reduces reliance on large battery banks, improves energy availability in the morning and evening, increases resistance to weather changes, and simplifies maintenance, which is especially important in the island contexts.

Beside smart energy harvesting, when multiple modules are connected, their wooden structures transform the space beneath into a sculptural experience. Roof beams designed in patterns inspired by palm leafs converge to form an organic, palm-like canopy. At the same time, round wooden columns referencing palm trunks create a forest-like atmosphere for the visitors below.

From a social perspective, the space beneath each module is highly adaptable to serve the needs of the local community. The primary module variant features an elevated, multi-use wooden terrace, for gatherings, children’s play, or simply relaxation. Other modules may be dedicated to agrivoltaic zones for shade-loving plants or natural gardens that support local flora. Together, these flexible units transform energy infrastructure into a diverse and vibrant public space.

The installation scales easily, from an XS project consisting of a single module to an XXL configuration, as presented in the project, composed of multiple interconnected units. To reduce costs and maintenance, units can be organized into larger clusters (e.g., three modules each) that share infrastructure such as LFP batteries, microinverters, and rainwater tanks. This decentralized system enhances resilience by allowing individual modules or small groups to fail without compromising the entire network.

Finally, from the narrative perspective, the installation’s composition draws from the repeated and rotated square motifs found in Polynesian *Masi* weaving, specifically the Qualitoka pattern, which symbolizes unity and collective focus toward a shared goal. Just like the symbolism within the pattern, the strength of Drau lies in its parts coming together to form a greater whole. It becomes an adaptive and sustainable celebration of community, energy of nature and tradition.

**2. TECHNOLOGY**

Drau technology combines well-known, proven, affordable, and sustainable solutions. These components are designed and integrated in a way that brings a new level of quality to standard off-grid energy infrastructure.

**Energy**

Single module energy system.

Input: sunlight > Output: clean energy.

* 6 x monocrystalline 430w solar panels 1.1 x 1.7 m, durable glass-glass tech with 30y warranty to ensure reliability of the whole system.
* Microinverter
* 2x LFP batteries 7 kWh

1 module XS

power 2.6 kW

orientation - N
yearly generation 4.2 MWh

3 module S
power 7.9 kW

orientation - 1 N / 1 E / 1 W
yearly generation 12.2 MWh

8 module M

power 21 kW
orientation - 4 N / 2 E /2 W

yearly generation 32.7 MWh

22 module L

power 57 kW
orientation - 10 N / 6 E /6 W

yearly generation 89.7 MWh

36 module XL

power 93 kW
orientation - 16 N / 10 E /10 W

yearly generation 146.2 MWh

40 module XXL

power 104 kW
orientation - 16 N / 12 E / 12 W

yearly generation 160 MWh

Installation is envisioned as a decentralised scaled system. When installation will grow with additional modules, the number of micro inverters, batteries and wiring can be reduced to cut costs and maintenance by grouping 2-3 modules into larger clusters with shared infrastructure. This strategy also ensures that one one module or single group will malfunction, it won’t affect the whole system.

**Water**

Rainwater is captured from the inclined metal roof, passes through a first-flush diverter and pre-filter, and is stored in a sealed 2400L tank. Water for drinking is accessed via a secondary filtered outlet; utility water is available directly from the main tap.

Single module water harvesting system.

Input: rainwater > Output: clean drinking or utility water.

* water collected from the 12,25 m2 roof into a steel gutter
* 1x stainless steel rainwater tank, to ensure durability and reduce microplastic - 2400 L
* first flush diverter & mechanic filter for larger particles
* 2x outputs : utility one for washing, cooking, irrigation & drinking water
* additional filters for drinking water output: ceramic & carbon filter

1 module XS

1 water tank

capacity 2400 L
yearly harvest 31 000 L

3 module S
1-3 water tanks

capacity 2400-7200 L
yearly harvest 94 000 L

8 module M

4 water tanks

capacity 9600 L

yearly harvest 250 000 L

22 module L

10 water tanks

capacity 24 000 L

yearly harvest 687 000 L

36 module XL

16 water tanks

capacity 38 400 L

yearly harvest 1 124 000 L

40 module XXL

16 water tanks

capacity 38 400 L

yearly harvest 1 245 000 L

Systems of filters simple and easy to maintain and/or replace if necessary. Two water outputs for each tank offer flexible water management. Bonus output: local plants, fruits and vegetables harvested under agrivoltaic modules.

**Structure**

Single module structure:

* locally sourced hardwood frame
* structure reinforced with cyclone metal straps & triangular corner steel brackets.
* wooden structure elevated from the ground.
* 4 x point foundations, under each column and slab under water tank,
* foundations made from a mix of cement, local sand and rocks
* 4x hardwood columns fi 16 cm mounted to foundations with long steel, central pins.
* the roof rotated and shaped to reduce wind pressure and edge uplift.
* anticyclone, rail mounting systems for solar panels.

Note:

* After structural engineer consultations regarding cyclones, wooden columns could be replaced with the steel circular ones in a smaller diameter.
* After geotechnical studies, concrete foundations could be replaced with the screw piles foundations

**3. PROTOTYPING & COLLABORATION**

Collaborative approach to prototyping with a strong emphasis on local partnership, and feedback-driven iteration.

**Prototype**

The prototyping process will end with the fabrication and assembly of a small single demonstration module e.g. 2 m x 2 m, either on-site in Marou. This prototype will include all key system elements: solar generation, battery storage, rainwater collection, and the integrated wooden platform and structure.

Possible phases:

* Planning the work - budget, logistics, shipping, prefabrication
* First site visit and community consultations
* Structural engineering consultation and updated engineering project
* Prefab elements fabrication
* Site visit and prototype assembly on site

Key objectives :

* Test structural integrity under real island conditions (wind, sun, rainfall).
* Evaluate functionality of solar and water systems under partial usage.
* Refine materials and joinery details using local timber species..
* Present Drau aesthetics in context
* Gather feedback from the local community

Community collaboration

* workshops & gathering feedback regarding community needs and local knowledge
* co-build, assembly of the prototype with local builders, craftspeople, serving both as proof of concept and as a live training opportunity.

**Pilot**

Following successful prototyping, we will scale up to implement a cluster of 2-3 interconnected modules, forming a complete unit that serves 10–15 households. This pilot cluster will test:

* full scale composition, resilience & aesthetics
* energy efficiency system
* water management system
* inter-module spacing and wiring,

Community collaboration:

* community workshops & gathering feedback regarding modules social function & location
* material gathering & prefab elements preparation (e.g. timber, woven palm coverings),
* co-build, assembly with local builders, craftspeople (with technical guidance),
* knowledge-sharing between villagers and outside facilitators, ensuring the methods are replicable and owned by the community

**4. MAINTENANCE & OPERATIONS**

Drua units are designed with simplicity, durability, and community participation at their core. Each module operates independently, requiring minimal intervention while remaining easy to inspect, clean, and repair. The system prioritizes long-term function in a remote island setting with limited access to technical infrastructure.

Solar and rainwater harvesting systems are designed to operate passively:

* Solar components require no daily input.
Battery and microinverter systems include integrated monitoring features to track performance and signal basic maintenance needs (e.g., low charge, replacement cycle).
* Rainwater flows through gravity and basic filtration systems.

Even such an independent system will need a maintenance schedule of small, regular tasks and checks. It can be based on the team of rotating, trained local stewards that will record them in a basic log. Educational materials will be provided in both English and Fijian, using diagrams for accessibility.

Every month

* Check and clean solar panels with soft cloths and water. Possible to clean from the ground with the long telescopic mop
* Inspect battery compartment and connections.
* Check and clean the first-flush system.
* Rinse sediment filter.
* Clean around the tank and structure for debris and insect control.

Every couple of months

* Inspect structural components for rust, wear, or loose fasteners.
* Replace carbon and ceramic water filters (if necessary).
* Confirm inverter and battery are performing efficiently (simple LED or app-based check).
* Inspect that overflow from tanks is properly draining into soil.

Every couple of years

* Replace batteries (depending on usage and capacity).
* Wooden steel plates check and/or replacement

Because the modules are decentralized and modular, failure in one does not affect others, ensuring resilience. Spare parts (filters, small tools) will be stored in a shared community maintenance hub, and components are designed to be easily replaced with local tools. External support (if needed) can be delivered for only specific units, without disrupting the overall system. By emphasizing low-tech systems, hands-on training, and shared responsibility, the operation and maintenance of Drau modules become part of community life. This approach ensures long-term stability and resilience—empowering the people of Marou to care for the infrastructure that support them.

**5. ENVIRONMENTAL IMPACT**

Drau is designed to minimize environmental impact and respect the island’s delicate ecosystems. Each unit combines natural materials in a low-footprint structure optimized for tropical conditions.

Challenges

* soil & vegetation disruption during installation
* changes in surface water flow due to rainwater collection
* introduction of foreign materials,
* logistics and waste
* cyclone-related risks

Solutions

* Ground contact is minimized using small-footprint concrete footings made from local sand and rocks.. Installation location avoids sensitive vegetation and uses clear ground wherever possible. After geotechnical survey and structural consultation, lightweight modular screw foundations could replace the concrete ones.
* Rainwater harvesting reduces surface runoff. To avoid erosion or imbalance, overflow from tanks is redirected to gardens or infiltration zones.
* All visible wood elements are sourced from native species found on Naviti Island. No imported plants or potentially invasive materials are used. Roof steel sheets could be already recycled. Steel elements are durable and chosen for their long lifespan and recyclability.
* Construction relies on prefabricated parts to reduce packaging and cutting waste. Local assembly ensures that material off-cuts and transport waste are minimal and managed responsibly. Prefab modular elements are scaled to reduce transport footprint and costs to minimum.
* The structure is designed for resilience in cyclone conditions. Wind deflecting roof shape, reinforced metal fixings, durable glass-glass solar panels and secure anchoring reduce the risk of material detachment or harm to surrounding ecosystems during storms.
* End-of-life Strategy: All components can be disassembled and reused or recycled. Battery management protocols are included for safe replacement and disposal.