THE DESIGN

KEY COMPONENTS

SOLAR SAIL SYSTEM

EV PANEL SYSTEM ON SOLID ROOF AND HONEYCOMB SUPPORTING STRUCTURE. EACH SAIL PROVIDE AN ESTIMATED 20KW OUTPUT. SOLAR SAIL TO BE ORIENTATED TO OPTIMISE ENERGY PRODUCTION FOR SPECIFIC SITE.

THE ROOF SYSTEM ALSO COLLECT RAIN WATER AND FEED INTO THE WATER INFRASTRUCTURE HUB.

MAIN STRUCTURE ſ

THE SOLAR SAIL IS SUPPORTED BY FIVE TIMBER BIOCOMPOSITE V-SHAPE POST STRUCTURE WITH ENGINEERED FOOTING DESIGN TO SUITE LOCAL GROUND AND CYCLONE CONDITION. DECORATIVE PATTERN AROUND BASE OF COLUMN TO BE DONE BY CRAFTSMAN IN THE COMMUNITY ON-SITE.

ELEVATED PLATFORM

ELEVATED PLATFORM MADE FROM **BIOCOMPOSITE TIMBER PLANKS** SUPPORT DIFFERENT PRODUCTION OR INFRASTRUCTURE HUBS. THE ELEVATED DESIGN ALSO PROVIDES FLOOD PROTECTION FOR THE EQUIPMENT.

PRODUCTION OR INFRASTRUCTURE HUB

VARIOUS TYPES OF PREFABRICATED PRODUCTION OR INFRASTRUCTURE HUB CAN BE INSTALLED TO MEET THE NEEDS OF EACH LOCATION. HUB AND ELEVATED PLATFORM CAN BE INSTALLED AT A FUTURE STAGE IF NECESSARY. HUB EXTERIOR CAN BE CUSTOMISED WITH LOCALLY DECORATED PANELS.

 \mathbf{U}

 \square

GREEN ROOF

GREEN ROOF TO BE INSTALLED ON TOP OF PREFABRICATED UNIT ON-SITE TO PROVIDE ADDITIONAL COOLING INSULATION.

COCONUT FIBRE SCREEN

OPTIONAL COCONUT FIBRE WOVEN SCREEN AS REQUIRED TO PROVIDE ADDITIONAL SUN SHADING. WOVEN PATTERN TO BE CREATED BY LOCAL COMMUNITY.

DECORATIVE MAST HEAD

BIOCOMPOSITE MAST HEAD 3D PRINTED. MAST HEAD DESIGNED TO BE CREATED WITH THE COMMUNITY.



LOCAL ENGAGEMENT AND CO-DESIGN PROCESS



CULTURAL AND COMMUNITY CONSIDERATIONS

PLANNING IS CO-DEVELOPED WITH LOCAL WOMEN, YOUTH, AND ELDERS TO REFLECT CULTURAL VALUES AND LAND-USE CUSTOMS. TRAINING IN REGENERATIVE FARMING, FIBRE INNOVATION, AND CLEAN ENERGY ENSURES LOCAL OWNERSHIP AND STEWARDSHIP. THIS INCLUSIVE APPROACH SUPPORTS LONG-TERM ECOLOGICAL CARE AND DIGNIFIED RURAL LIVELIHOODS.

LOCAL DESIGN INPUTS

THE DESIGN OFFERS MULTIPLE OPPORTUNITIES FOR THE COMMUNITY TO SHAPE AND EXPRESS THEIR LOCAL IDENTITY THROUGH THE FINAL AESTHETIC. KEY ELEMENTS - SUCH AS THE SUPPORT COLUMNS, MASTHEAD, WOVEN SCREENS & PREFRABRICATED UNIT EXTERNAL LINING PROVIDE A POTENTIAL CANVAS FOR STORYTELLING, CREATING DESIGNS THAT VISUALLY DISTINCT & DEEPLY ROOTED IN PLACE.

ACTIVE PARTICIPATIONS

THE TIMBER MATERIAL AS WELL AS THE WOVEN SCREEN ALLOW THEM TO BE WORKED ON USING TRADITIONAL TECHNIQUES. THE ELEMENTS WILL BE DELIVERED TO SITE AND TIME WILL BE ALLOWED FOR THE COMMUNITY TO CREATE CARVING ON THE TIMBER STRUCTURE OR WEAVE THE SPECIFIC PATTERN PRIOR TO FINAL INSTALLATION OF EACH UNIT.

UNIT LAYOUT AND FUNCTIONALITY OPTIONS



PRODUCTION HUB FIBRE UNIT OR FOOD PROCESSING UNIT

PREFABRICATED UNITS FULLY FITTED WITH THE REQUIRED EQUIPMENT FOR THE SELECTED PROCESS WILL BE DELIVERED TO SITE READY FOR OPERATION. EACH UNIT IS DESIGNED TO FIT THE SPACE WITHIN A 20FT CONTAINER TO ALLOW FOR EASY SHORE DELIVERY. FINAL INSTALLATION OF CUSTOMISED DECORATIVE EXTERNAL LINING TO BE DONE BY LOCAL COMMUNITY.

ENERGY GENERATION



SOLAR SAIL (ROOF) SOLAR ENERGY PRODUCTION UNIT

A SOLAR SAIL (ROOF) IS INTEGRATED INTO EACH 'DRUA' UNIT, GENERATING AN ESTIMATED 20KW OF SOLAR ENERGY PER UNIT BASED ON THE ROOF AREA. EACH UNIT IS CONNECTED TO A CENTRAL ELECTRICAL AND BATTERY HUB.

- THE SYSTEM WILL DELIVER:
- 200KW HYBRID INVERTERS WITH AN ESTIMATED TOTAL OF 120KW SOLAR PV ACROSS ALL 6 SAILS
- 800KW HV LIFEPO4 MODULAR BATTERY BANKS - SCADA-AI BASED REAL-TIME MONITORING AND CONTROL - SMART DEMAND MANAGEMENT USING SMART METERS
- AND CONTROLLERS FOR EACH HOUSEHOLD TO MAXIMIZE SYSTEM EFFICIENCY, A SMART ENERGY

MANAGEMENT LAYER IS DEPLOYED USING IOT-ENABLED MONITORING AND CONTROL DEVICES. THESE WORK WITH MACHINE LEARNING ALGORITHMS TO FORECAST ENERGY GENERATION AND USAGE. BY ANTICIPATING LOAD CURVES AND SOLAR AVAILABILITY, THE SYSTEM CAN DYNAMICALLY CHARGE BATTERIES AND ACTIVATE NON-TIME-CRITICAL LOADS - SUCH AS WATER PUMPING, FOOD DRYING, OR FIBRE PROCESSING - DURING SURPLUS PERIODS. THIS PREDICTIVE APPROACH BOOSTS SOLAR UTILIZATION, REDUCES ENERGY WASTE, AND ENHANCES THE ECONOMIC VALUE OF EVERY KILOWATT PRODUCED.



INFRASTRUCTURE HUB POWER OR WATER UNIT

PREFABRICATED UNITS FULLY FITTED WITH THE REQUIRED EQUIPMENT FOR PORTABLE WATER FILTRATION, WATER PUMP OR SOLAR SYSTEM CONTROL UNIT AND BATTERY STORAGE UNIT, DELIVERED TO SITE READY FOR OPERATION.

MATERIALS

ONE FULL LATEEN SAIL WILL BE CONSTRUCTED WITH THE FOLLOWING ELEMENTS & MATERIALS: - 5X TRIANGULATED ROUND TIMBER STRUTS SET IN CONCRETE FOOTINGS, TO FORM THE CORE STRUCTURE. - TRIANGLE ROOF STRUCTURE BUILT WITH AN INTERLOCKING GRID OF BEAMS MADE FROM AN EXTRUDED BIOCOMPOSITE COMPRISING POST-CONSUMER PLASTIC AND COCONUT FIBRE.

- FLOOR PLATFORM STRUCTURE AGAIN UTILISING PLASTIC/ COCONUT FIBRE BIOCOMPOSITE STRUCTURAL JOISTS AND FLOORBOARDS

- COCONUT FIBRE WEATHER SCREENS.

PROTOTYPE APPROACH

THIS PHASE INVOLVES CONSTRUCTING ONE LATEEN SAIL TO DEMONSTRATE AND TEST THE INTEGRATED FUNCTIONS OF THE SYSTEM—SOLAR ENERGY GENERATION. RAIN-WATER HARVESTING, REGENERATIVE AGRICULTURE, AND PRODUCTIVE-USE ENTERPRISE. THE PROTOTYPE UNIT WILL BE DESIGNED FOR DECONSTRUCTION AND RELOCATION TO THE PROJECT SITE AS ONE OF THE SIX PROPOSED UNITS.

THE PROTOTYPE IN SUVA WILL INCLUDE THE FOLLOWING ELEMENTS:

- ONE THIRD OF THE ROOF STRUCTURE CLAD IN THE SOLAR PV ARRAY TO TEST TECHNICAL PERFORMANCE AND SUPPLY THE MINI PROCESSING UNIT.
- 2 FULL LATEEN SAIL AND MAIN STRUCTURE UNIT TO DEMONSTRATE VISUALLY THE FULL SCALE OF THE PROPOSED DESIGN.
- 3 ONE MINI ANCHOR ENTERPRISE EITHER A MICRO FOOD PROCESSING UNIT OR FIBRE HUB MODULE—SELECTED THROUGH COMMUNITY DECISION-MAKING.
- △ A GREEN ROOF INSTALLED ABOVE THE PROCESSING UNIT FOR INSULATION AND COIR-BASED WATER FILTRATION SYSTEM.
- 5 LOCALLY WOVEN COCONUT FIBRE WEATHER SCREENS.
- A DEMO PLOT OF DIFFERENT PLANTS USING REUSABLE PLANTER BOXES SUITABLE FOR RELOCATION.



COMMUNAL HUB **COMMUNAL ACTIVITY UNIT**

SOLAR SAIL, IF NOT NEEDED AS ONE OF THE PRODUCTION OR INFRASTRUCTURE HUBS, PROVIDES SHADED AREA THAT CAN BE ADAPTED FOR DIFFERENT ACTIVITIES BY THE COMMUNITY. IT CAN ALSO BE USED AS ADDITIONAL SPACE TO SUPPORT THE PRODUCTION HUB WHEN REQUIRED.

