



## “Eco-Fly Melodia: Intelligent Living. Infinite Energy.”

“Eco-Fly Melodi” is a scalable, growable, and adaptable modular system that integrates energy generation, sustainable living, and multifunctional infrastructure into a unified architectural and technological solution. The system is based around a central parabolic mirror structure with a rotatable core and attachable modules that serve multiple functions: energy towers, living accommodations, floating platforms (living module as well as), agricultural hubs, and community spaces, living module and infrustructure energy tower pavilion. Eco-Fly Melodia is a community-led renewable energy system designed for rural self-sufficiency. Its innovative design couples a highly efficient photovoltaic production system with a kinetic energy storage mechanism that acts as a “battery,” while integrating interactive artistic features. Locally accessible materials are used throughout, empowering the community to construct, maintain, and eventually replicate the system independently. “Eco-Fly Melodi” adaptive solar modules, an infrastructure system that synthesizes solar energy generation, water harvesting, and modular architecture into one transformative design. The core element is a rotatable parabolic mirror structure that not only powers the site but anchors diverse land-based and floating functionalities such as housing, agriculture, public gathering spaces, and ecological restoration areas. The architectural design draws deep inspiration from traditional Fijian bure structures, which reflect the indigenous architectural heritage of Fiji. A bure is a thatch-roofed, timber-framed dwelling constructed using locally sourced, sustainable materials and arranged in communal clusters. These structures are known for their elevated platforms, natural ventilation, and adaptability to the tropical climate. Our design translates the cultural principles of the bure—communal living, climatic responsiveness, structural simplicity, and symbolic centrality—into a futuristic and resilient energy architecture. Much like the central post of a bure, our modules feature a central technical spine—a rotatable mirror mast—which becomes both the literal and symbolic anchor of each unit. The modularity reflects traditional village planning where structures are independent yet interdependent, adaptable yet connected. Roof structures echo the wide, overhanging forms of traditional thatch, reinterpreted here in reflective and solar-active materials. Public and communal uses—shaded markets, classrooms, kitchens, storytelling spaces—are embedded into the architectural vocabulary. The primary design material palette includes local wood and bure material, steel structural supports, and solar panels etc. These materials are chosen for durability, lightness, and resistance to environments, ensuring long-term performance in the Fiji climate. At the center of each unit is a mechanically kinetic-rotatable parabolic mirror that tracks the sun, optimizing solar concentration. Beneath it, a technical core (radius approx. 50 cm) houses infrastructure systems: electrical cabling, piping, energy storage, and solar-thermal technology.

Surrounding this, modular elements may be added to serve multiple purposes depending on community needs: classrooms, event spaces, shaded markets, agricultural greenhouses, kitchens, or accommodations. These structures are scalable and flexible. They can function as individual micro-units or be aggregated into urban-scale networks that grow as demand increases. Like a wearable garment, the structure **“dress-like”** itself differently based on function: standalone pavilions, two- or three-story living units, or floating modules for climate resilience. Community experience is at the heart of the design. Modules are intended to be co-owned, co-maintained, and co-programmed by local users. Their configurations provide shade by day, ambient light by night (through LED arrays powered by stored energy), and serve as inclusive, safe public spaces. Rainwater collection from the mirror’s central apex supports drinking water storage and irrigation. The design blends energy independence, community empowerment, and adaptability, creating a circular economy at the site level. The integration of art, energy, infrastructure, and social architecture provides a multi-functional response to Fiji’s environmental, economic, and cultural context.

### A. Adaptable and Scalable Modular Design

A planar parabolic mirror structure can be used in various configurations, including as a pavilion by itself, wearing living space module on ground or on water or a multi-functional social space when they comes together with different amount, scales and variants.. It can be scaled to accommodate varying sizes, dimensions, and energy requirements. This adaptability ensures that the system can serve diverse functions, from a tourist accommodation to local community spaces, vegetable cultivation areas, or recreational spaces. Version of living space module can provide local economic and job opportunity for local community as well as floating villa version that can be designed with A planar parabolic mirror structure.Briefly; A planar parabolic mirror structure can be wearable by living modular structure to create variants of module instead to provide only energy tower by itself. Multifunctional idea can be provable with many different living, or energy tower or pavilion version.

**Living Modules Version:** The design incorporates living space modules with two floors. The ground floor serves as a public area with shading, offering private entrances. The first floor is dedicated to living space, while the second floor can serve as a technical support area, recreational space, or pool, depending on future requirements.