**SELSEBİL PROJECT NARRATİVE DOCUMENT**

**‘Pouring Energy from the Sky’**

1. **Concept Narrative**

**Selsebil** is a public space that both produces energy and revitalizes life by collecting the gifts of life flowing from the sky – light, wind and water. The project represents a functional, aesthetic and community-oriented unity with minimal intervention in nature.

**The hybrid umbrella structures** at the core of the design both produce energy as solar panels and transform into turbines by spiraling into a vertical form in windy weather. These umbrellas also create shade, collect rainwater, and serve as public canopies where people can gather.

**Reflecting ponds** are one of the aesthetic and ecological components of the project. In line with the natural flow paths in the area, surface water formed after rain is collected in artificial ponds before reaching the sea. These ponds reflect sunlight, creating a visual focus and providing microclimate regulation in the surrounding areas. Natural insect repellent plants (*Azadirachta indica and Eucalyptus globulus*) will be integrated into the surroundings to prevent the proliferation of mosquitoes. This system also works as part of biological filtration.

**The material** selection is based on local and sustainable resources: Stainless steel carrier systems, high-strength membrane covers, natural components such as bamboo and volcanic stone form the main backbone of the structure. The umbrella design is planned based on flexibility, lightness and resistance to wind loads.

**The community experience** includes not only being a user but also being a co-producer. The villagers learn to install the systems by participating in the construction process and directly experience their use, maintenance and ownership. For visitors, Selsebil is not just an energy facility; it is a learning space where people can sit in the shade, do cultural activities and get in touch with local nature.

**Co-benefits** include microclimate regulation, support of the water cycle, clean water production with natural biofiltration systems with local edible plant species (such as *Cyperus javanicus, Phragmites karka, Heliconia spp., Colocasia esculenta (Taro)*). In addition, in cases where filtered rainwater needs to reach drinking water quality, advanced purification technologies such as graphene-based nanofiltration systems and ion exchange units can be used. These systems can be adjusted at the molecular level to precisely filter particles of different sizes, allowing healthy minerals (such as calcium and magnesium) to be preserved in drinking water. They can be easily integrated with renewable energy systems thanks to their ability to operate at low pressure and room temperature. The project creates a productive public space that both protects nature and focuses on people.

**Land use** is multi-layered: Energy production, water harvesting, ecological ponds, rest and learning areas are designed together. Thus, “an environmental art that is not only useful but also touching and strongly connected to the place” emerges.

Selsebil is a system that works with light from the sky but the root always touches the soil. It is silent but it is lively. It is strong but it remains elegant.

1. **Technical Narrative**

Selsebil incorporates a hybrid renewable energy system and an integrated water harvesting and purification strategy tailored for coastal island resilience. The primary technologies include:

* **Photovoltaic solar panels** integrated on the umbrella canopy surfaces to generate at least 100 kW of clean electricity during sunny hours.
* **Wind energy capture** through the spiral transformation of the umbrellas during windy weather, functioning like a vertical-axis turbine. To increase safety during severe weather conditions, the turbine modules are designed to shut down and go into a closed protection mode during a hurricane. Additionally, each unit has a vertical rail system that allows the umbrella head to be lowered and cleaning and maintenance can be easily done by villagers at ground level. This approach both extends the life of the system and strengthens community participation.
* **Rainwater harvesting** via the inward-sloped canopy surfaces, directing water into artificial reflective ponds.
* **Water purification** using a combination of membrane-based nanofiltration, reverse osmosis, and ion exchange systems to produce drinkable water.
* **Energy storage** in modular battery banks to ensure availability during nighttime or cloudy conditions.
* **Biofiltration and ecological landscaping** using native plants for water polishing, mosquito control, and microclimate regulation.
* **Cultural integration** through woven mat panels and shading textiles, linking local craft to energy infrastructure.

These technologies were selected for their compatibility with remote island logistics, low maintenance, and adaptability to harsh climate conditions including category 5 cyclones.

1. **Prototyping and Pilot Implementation Statement**

Our team approaches the Selsebil project as a collaborative, adaptive process rooted in mutual learning and local empowerment. The prototyping phase will begin off-site, with the fabrication of modular hybrid canopies, mechanical systems, and prefabricated support units. These components will then be transported to Marou Village, where the full-scale pilot implementation will take place.

While the energy systems require specialized engineering knowledge, the broader construction process is intentionally designed to welcome meaningful involvement from the local community. Residents will contribute to activities such as assembling structural elements, preparing foundations, managing landscaping, and assisting with the installation of water systems. These tasks align with traditional skills and community-based knowledge already present in Marou.

To support this engagement, we will organize hands-on workshops using visual tools and peer-to-peer learning models. Local volunteers will be invited to participate, and tasks will be assigned based on comfort, experience, and physical accessibility. A key element of our approach is a rail-based mechanism that allows the turbine heads to descend to ground level, enabling safe maintenance and cleaning by the community without special equipment.

Ultimately, Selsebil will not be delivered as a finished system, but built with the community — physically, socially, and symbolically — to ensure a sense of ownership, capacity-building, and long-term resilience.

1. **Operations and Maintenance Statement**

The Selsebil system is designed to be operated and maintained by the local community throughout its lifecycle. The project aims not only to provide sustainable energy and clean water, but also to foster a sense of ownership and capacity-building among the residents of Marou Village. This approach supports long-term functionality while empowering local people to manage and care for their own infrastructure.

The hybrid umbrella structures generate both solar and wind energy and are built using corrosion-resistant materials, plug-and-play components, and minimal moving parts. These features ensure safe and reliable operation without requiring advanced technical knowledge. A key feature is the integrated **rail mechanism** that allows the turbine head to be lowered to ground level for cleaning and inspection. This eliminates the need for ladders or scaffolding and makes the system accessible to everyone, including elders, women, and those with limited mobility.

Routine maintenance will be planned seasonally, aligned with the rhythms of daily village life. Key tasks include:

* Cleaning the solar panels to maintain efficiency,
* Checking battery storage levels,
* Visually inspecting water tanks and filtration systems,
* Monitoring the health of wetland plants used for biofiltration,
* Managing the artificial ponds with natural mosquito-repelling plants.

A **rotating team of trained local volunteers** will be responsible for carrying out these tasks. Hands-on workshops and visual instruction manuals will be provided, ensuring accessibility for individuals with varying levels of literacy or experience. All instructions and diagrams will be adapted to the local language and cultural context.

For more technical components—such as the nanofiltration and ion exchange systems used for water purification—basic maintenance and filter replacement will be possible on-site. The system will include a secure storage unit with essential spare parts such as replacement filters, salt tanks, and resin cartridges. In the event of more complex issues, remote technical support will be available through an optional digital monitoring platform.

The system’s performance will be enhanced with low-cost sensors for tracking energy output, water quality, and system status. This data can be used locally for awareness and planning, or shared remotely with external experts when necessary.

This decentralized and inclusive operations strategy transforms Selsebil from a passive utility into a living system embedded within the community. By sharing responsibilities and fostering a culture of stewardship, the project not only sustains itself technically, but also contributes to social resilience, local autonomy, and intergenerational knowledge transfer.

1. **Environmental Impact Assessment**

The Selsebil project has been designed with an emphasis on ecological sensitivity, environmental stewardship, and climate resilience. Set within the unique ecosystem of Marou Village in Fiji’s Yasawa archipelago, the installation aims not only to avoid harm to the environment, but to operate as a regenerative component of the natural landscape.

**Potential Environmental Impacts:**
As with any construction in sensitive coastal environments, there are potential risks that must be carefully managed. These include:

* **Soil disruption** during foundation placement, which may disturb native vegetation or local microfauna.
* **Changes in natural water flow**, particularly during the redirection of stormwater into artificial ponds. Improper management could lead to stagnant water accumulation.
* **Biodiversity stress**, if non-native plants or materials are introduced.
* **Increased mosquito activity**, if standing water sources are not managed with ecological design in mind.
* **Visual or spatial disruption** of habitats, particularly in nesting or migration zones for birds and other local species.
* **Construction-related waste**, if not properly removed, could contribute to pollution or ecosystem imbalance.

**Mitigation Strategies and Design Adaptations:**
To minimize these risks and ensure long-term environmental integrity, several integrated strategies have been adopted:

1. **Low-Impact Construction:**
All support structures will use lightweight foundations that require little or no excavation. Structural placement will avoid root zones of existing trees, and heavy machinery will not be used.
2. **Water Management and Pond Design:**
Rainwater harvested from the hybrid umbrella structures will be directed into shallow, **artificial reflective ponds** aligned with natural drainage channels. These ponds serve not only as aesthetic elements, but also function in microclimate cooling and flood control. Overflow channels will ensure excess water returns safely to the environment during heavy rainfall.
3. **Eco-Friendly Filtration and Mosquito Control:**
Ponds will be planted with **native wetland species** such as *Cyperus javanicus* and *Colocasia esculenta*, which provide natural biofiltration. To prevent mosquito breeding, **natural repellents** like *Azadirachta indica* and *Eucalyptus globulus* will be incorporated into pond margins instead of chemical treatments.
4. **Local Plant Use and Material Selection:**
Landscaping will incorporate **only locally available, non-invasive plant species**. No imported organic materials will be used that might carry foreign seeds or insects. Building materials such as bamboo, volcanic stone, and palm are chosen for both their environmental and cultural compatibility.
5. **Zero Emissions and Pollution-Free Operation:**
The entire system operates with **zero carbon emissions** and produces no wastewater or chemical discharge. All energy is generated renewably, and water is filtered through environmentally safe methods like nanofiltration and ion exchange systems.
6. **Waste Management and Monitoring:**
Construction waste will be minimized, sorted, and removed from the island after the installation is complete. Environmental monitoring, including **water quality checks and plant health inspections**, will be conducted seasonally by trained community members.
7. **Education and Awareness:**
A core component of the project is **community education**. Through workshops and signage, residents will gain knowledge of environmental conservation practices, helping them become active stewards of the system and its ecological surroundings.

In summary, Selsebil is designed to function not as an intrusion, but as an **extension of the local ecosystem** — harmonizing with natural cycles, enriching biodiversity, and providing long-term environmental benefits through careful planning and community collaboration.